MACWORLD TESTS THE BEST MAC SCANNERS, PRINTERS, AND DIGITAL CAMERAS, P. 74

OCTOBER 1998

# Macworld

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## Everything You Ever Wanted to Know about the iMac but Were Afraid to Ask*

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# Macworld

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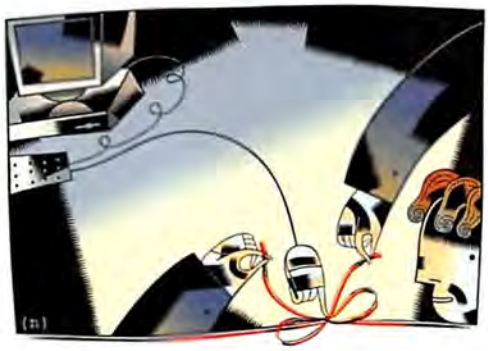



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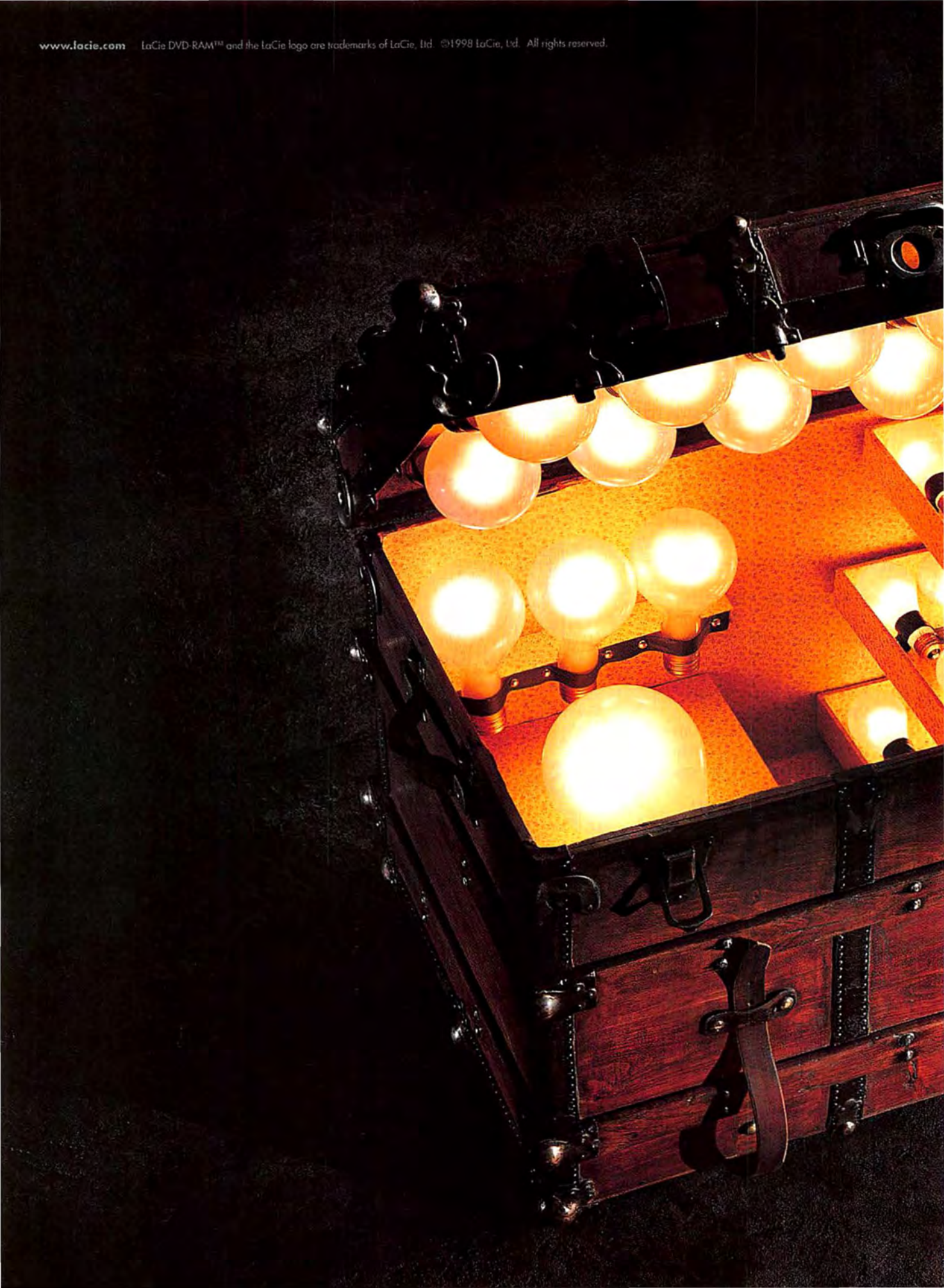
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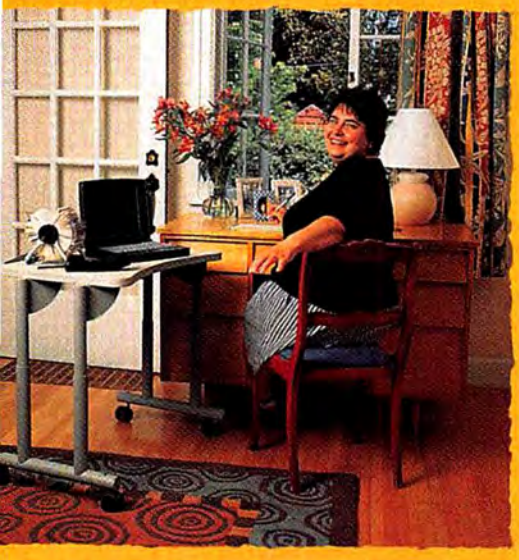
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# Letters

## Leaping to G3

I VERY MUCH ENJOYED YOUR ARTICLE on G3 upgrade cards ("Quantum Leap," July 1998). I own a Newer Technology Maxpowr G3 275/183, which I installed on my Power Computing PowerWave 604/132. It works like a charm. It's curious, however, that the reviewer didn't mention that the G3 control panel permits users to change the cache-to-bus ratio from 3:2 to 1:1. In effect, it's like getting a 275/275 card for quite a bit less money.

JEFFREY NIEDERHOFFER
*Staten Island, New York*

*You are correct, sir—some of the cards do let you change the ratio. Don't get your hopes too high, though, since the speed gain you'll get by changing the ratio will probably be unnoticeable. —Macworld Lab*

ANOTHER REASON WHY MANY POWER Macintosh 500- and 600-series owners would opt for a G3 upgrade card rather than a new G3 Mac: the high-end offerings in Apple's G3 line aren't compelling for many high-end–Mac users—due to the IDE drives and an insufficient number of PCI slots—but many of the 500- and 600-series Macs have six PCI slots, have lots of room for RAM expansion, and use SCSI drives. I know several Mac consultants who recommend that clients purchase 500- or 600-series Macs and pop in a G3 card instead of buying a G3 Mac.

TAYLOR SINCLAIR
*Pittsburgh, Pennsylvania*

## Steve's Slice and Dice

DAVID POGUE'S "STEVE JOBS, RAZOR Blade" was particularly poignant (*The Desktop Critic*, July 1998). Although characterizing Jobs's turnaround techniques as harsh is something of an understatement, no one can argue with the results Jobs achieves. Apple has demonstrated a return to its creative roots with some imaginative developments. There seems to be no end to the exciting new projects for us to look forward to.



TY MORTON
*Keene, New Hampshire*

I DISAGREE WITH ONE OF DAVID Pogue's points in July's *The Desktop Critic*. I don't believe Steve Jobs's making CompUSA an exclusive Mac dealer has meant a significant improvement in the public's perception of Mac products. I have been to three CompUSA stores in two states, and the conditions were the same: instead of pathetic, broken-down Performas, I found G3's that were nonfunctioning or missing various files from the OS. In addition, the staff members were not knowledgeable about the Mac and suggested that I look at Wintel machines. They also carry few Mac software titles, and some are even camouflaged by Windows titles. This reinforces—instead of diminishes—the public's perception of Macintosh decline. Steve needs to make some serious decisions about whom Apple partners with.

ALFONSO BULLOCK
*San Juan, Puerto Rico*

## The Story behind Dramatica

YOUR REVIEW OF DRAMATICA PRO 3.0 gives the impression that the Dramatica Theory of story was developed as part of the software (*Reviews*, July 1998). In fact, the Dramatica Theory was under development for 15 years before the software was created.

I am one of the cocreators of Dramatica Theory, and I maintain an extensive Web site at www.heartcorps.com/dramatica/, where writers can find a complete copy of the 450-theory book, constructive criticisms of well-known stories, answers to questions, tips, tricks, and RealAudio presentations of my UCLA Extension class lectures on Dramatica Theory.

MELANIE ANNE PHILLIPS
*Burbank, California*

## Sweet and Sour iMac

I'M ASTOUNDED BY YOUR DEFENSE of Apple's decision not to include a floppy drive with the iMac ("The iMac Cometh," July 1998). Although it's certainly not practical to back up your hard disk to floppies these days, using floppies is still an inexpensive, convenient way to back up personal files. Add-on solutions

*continues*

JEFF NEUMANN

## CORRECTIONS

- *The iMac's monitor-refresh rates are 117Hz and 75Hz, not 117MHz and 75MHz ("The iMac Cometh," July 1998).*
- *Two photos in "Optical-Zoom Digital Cameras"* (Reviews, *August 1998) are labeled incorrectly: photo B was taken with the Fuji DX-9 and photo C with the Olympus D-500L.*

reduce the elegance of the iMac's all-in-one design, and they're a waste of desk space. And although a floppy drive adds little to the cost of a computer, an external USB floppy drive will probably cost at least $50. As these added costs start to stack up, the iMac isn't exactly looking like a bargain. Especially if you also need to buy adapters to use all your old hardware.

I think the iMac is a fabulous-looking computer. It's going to wow a lot of people. But a lot of potential buyers will sadly give the machine a pass when they discover that Apple skimped on a floppy drive and expansion slots. But that may be what Apple wants. What better way to preserve the sales of your high-end systems than by offering low-end systems that won't address your customers' most basic needs?

L. GOODMAN
*via Macworld Online*

I LIKE THE IMAC'S DESIGN AND LOW price, but I'm concerned about its lack of a SCSI connector. I have a Mac IIci, an LC 476, a PowerBook, a StyleWriter II, a LaserWriter II SC, and several SCSI drives for storage. It's not practical for me to trash all my SCSI equipment. How does Apple expect to sell home computers that can't connect to all the equipment people have invested in? My old Macs and LaserWriter SC still work just fine, and until Apple includes connectors and software drivers to support my old accessories, I'll stick with my old system. Apple, please add a SCSI connector to the iMac!

MIKE KEMERER
*via Macworld Online*

I WOULD LIKE TO COMMEND APPLE on the iMac. It is everything that is Macintosh—innovative, daring, easy to use, and fast. Plus, I'm glad to see the floppy drive go. I never use floppies. The subtraction of the floppy drive and the addition of USB in the iMac just show that Apple is moving ahead, away from ancient and useless technologies. Great work—I can't wait for my iMac.

ANTHONY RANDAZZO
*Palm Bay, Florida*

IF STEVE JOBS IS SO DAMN SMART, why did he approve the next great Apple disaster, the iMac? I can't believe that Apple would return to the consumer market by offering a Mac that is completely incompatible with the current installed base of Macs and software. No floppy drive? How does one load software that's not on CD-ROM? No ADB, SCSI, or Mac serial ports? This eliminates the use of every Mac peripheral currently in existence. There is such a thing as being too far ahead of your time, and the iMac is a good example.

ERIC WENOCUR
*Silver Spring, Maryland*

PEOPLE ARE STILL LIVING IN THE past. Loosen up! I believe that Steve has seen the future: the iMac is the Internet Mac. It doesn't need peripherals or floppies. It connects to the network, period. It works only on the Internet. If this were a computer of the past, it would have all that other stuff, but would a computer of the past have 100BaseT Ethernet built in for home use? The iMac is the coolest consumer computer introduced in a long time. Wintel machines look like dinosaurs, and the iMacs look like small, surviving mammals. If the iMac connects easily to the Internet, it could become the computer for the rest of the world.

ROBERT M. WITT
*Indianapolis, Indiana*

THE ABSENCE OF A FLOPPY DRIVE and SCSI ports on the iMac does not mean they're "missing links." Rather, the former is due to a long-overdue recognition that floppy disks, with their minuscule storage capacity, are no longer a satisfactory solution for data storage and backup, and the latter allows daisy-chaining external devices without SCSI ID concerns. The iMac is a perfect computer for schools. With Apple's Network Administrator Toolkit, student and teacher files can be kept in directories on a server. And it's a great home desktop computer for budget-conscious consumers. Peripherals can be added as your budget allows.

JOEL LITTAUER
*Los Angeles, California*

## OmniPage Pro Peeve

OMNIPAGE PRO 8.0 HAS AN IMPORtant flaw: once you've scanned something, "autopaste" transfers that document to Microsoft Word 98 *without* carriage returns (*Reviews*, July 1998). The end of each paragraph has a line break instead of a carriage return. You must then do a global search and replace in Word (replacing ^l with ^p) to make the changes. Caere's suggested alternative is saving the file and opening it in Word or manually cutting and pasting each page via the Clipboard. Sure, these workarounds accomplish the task—but they are cumbersome and should be unnecessary in such a highly rated program.

TED GORDON
*San Rafael, California*

## PowerBook G3 Letdown

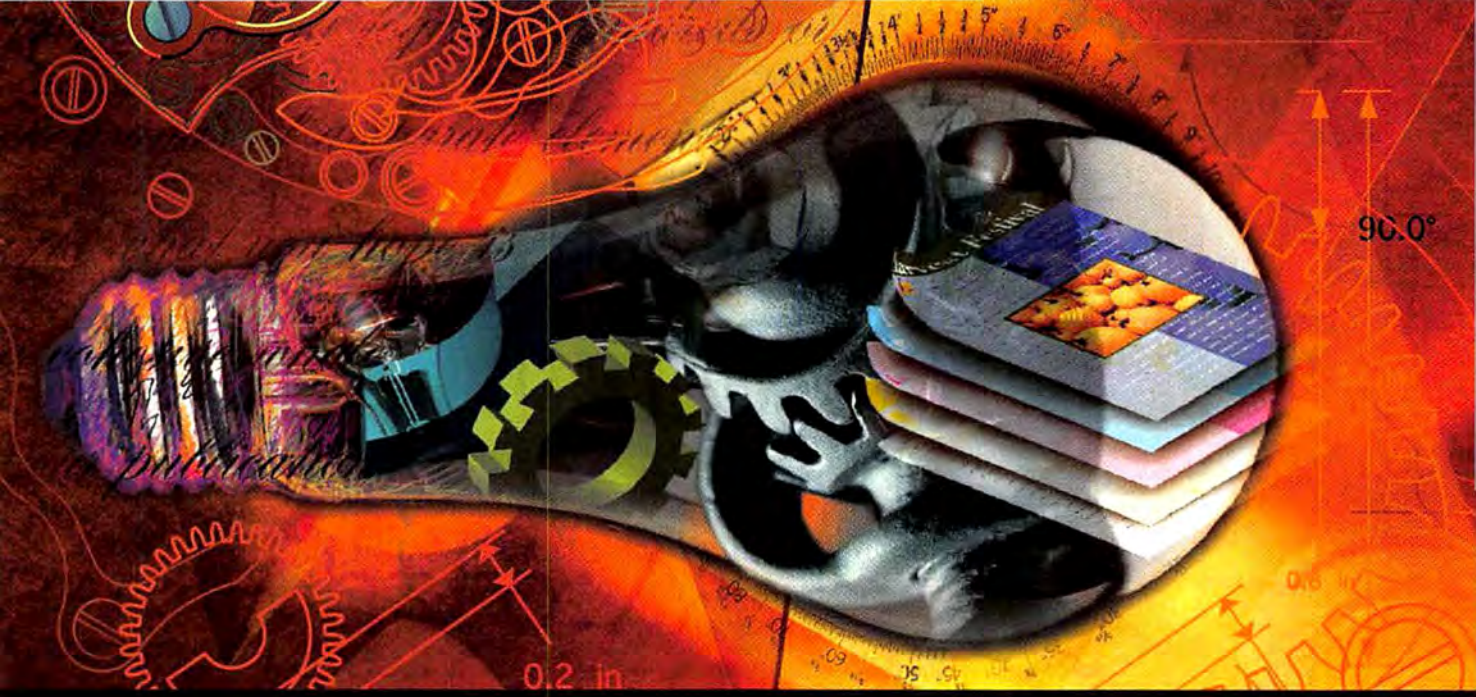
I TEACH DIGITAL IMAGING AND MULtimedia development to college students. Between office, home, and lab, I use four Macs, so when I read about the new PowerBook G3's (*Reviews*, July 1998) I thought my prayers were answered—finally, I can have everything on one machine.

But there's a problem. For years I've done my Adobe Photoshop and Macromedia Director work on a Power Mac 8100 AV with the video card driving a second monitor, with contiguous mousing between the screens. When I learned that the high-end G3's come with video-out and 4MB of VRAM, I figured I could use the PowerBook screen and my 17-inch monitor this way, but I can't. I can drive a big monitor and mirror it on the PowerBook screen, but I can't use the two side by side. If Apple intends these laptops to be viable alternatives to desktop Macs, how come nobody thought of this?

WILLIAM JENKINS
*Tempe, Arizona*

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Letters should be sent to *Letters*, Macworld, 301 Howard St., 16th Fl., San Francisco, CA 94105; via fax, 415/442-0766; or electronically via CompuServe (70370,702), MCI Mail (294-8078), AppleLink (Macworld1), or the Internet (letters@macworld.com). Include a return address and daytime phone number. Due to the high volume of mail received, we can't respond personally to each letter. We reserve the right to edit all letters. All published letters become the property of *Macworld*. m




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"By being easier to use than similar products and importing many file formats, Canvas is a good adjunct to tools you may already own – or a wise initial investment." Infoworld

"One look at Deneba Canvas' long list of features, and you'll see the great value stuffed in this single box. Canvas... has raised the bar of excellence for all graphic applications." Desktop Publishers Journal

"[Canvas] gives you integrated photo editing, desktop publishing and illustrating. Most software offers you any one of these capabilities, but not all three. Having this kind of versatility in a single application makes it easy to seamlessly assemble and design an entire project from beginning to end." PC Photo

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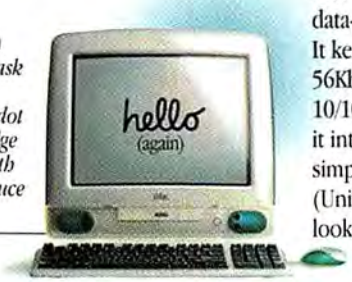
# Say Hello to the future.

## Beyond the Ordinary.

The next wave of computing has arrived, and it's name is iMac.

The iMac's purpose is to make Internet access easy, and it does that with one-button simplicity. But it also does a lot more. It kills the PC competition with data-crunching 233MHz G3 speed. It keeps you connected with a built-in 56Kbps modem and integrated 10/100BaseT Ethernet support. And it introduces a whole new level of simplicity and speed with two USB (Universal Serial Bus) ports. Plus, it looks really cool. So say good-bye to the past, and say hello to iMac!

*The 15" (13.8" viewable) display with shadow mask technology, 1024 x 768 resolution, and .28mm dot pitch delivers edge-to-edge sharpness and focus, with high refresh rates to reduce flicker and eye strain.*




## ACCESSORIES

### Apple

| | | |
|---|---|---|
| 56129 | Power AC Adapters | $79 |
| 56131 | Lithium-Ion Rechargeable Battery | 229 |
| 56133 | G3 Floppy Disk Drive Expansion Bay Module | 109 |
| 48164 | G3 Lithium Ion Battery | 259.95 |
| 35931 | 1400 NiMH Battery | 135.95 |
| 38465 | 3400 Lithium Ion Battery | 199.95 |
| 16033 | PowerBook 500 Battery | 125.95 |
| 35928 | PowerBook AC Adapter 1400, 2400, 3400 | 49.95 |
| 44248 | 2400 Spare Floppy Drive | 149.95 |
| 35929 | PowerBook 1400 Video Out | 149.95 |

## CARRYING CASES

### Targus

| | | |
|---|---|---|
| 7369 | Targus Notepac (Black) | $39.95 |
| 31084 | Targus NotePac Plus | 59.95 |
| 1305 | Universal Notebook Case (Black) | 69.95 |
| 29851 | Universal Deluxe Carrying Case | 129.95 |
| 56460 | Air Universal w/FREE Fanny Pack | 99.95 |
| 41412 | Digital Camera Case-Nylon | 39.95 |
| 48238 | PDA/Handheld Leather Wallet | 39.95 |
| 48239 | PDA/Handheld Leather Double Wallet | 59.95 |
| 48243 | Full-Size Leather Portfolio | 99.95 |

### Kensington

| | | |
|---|---|---|
| 10410 | Kensington Deluxe Computer Carrying Case | $54.95 |
| 7060 | MicroSaver Security Cable System | 39.95 |
| 48823 | Sky Runner Nylon Carrying Case | 69.95 |
| 35526 | Saddle Bag Black w/Black Trim | 89.95 |
| 33443 | Saddle Bag Black w/Brown Trim | 89.95 |
| 9585 | Executive Computer Case | 99.95 |

## DATA STORAGE

### Iomega

| | | |
|---|---|---|
| 19171 | 100MB Zip Drive - SCSI Ext. | $119.95 |
| 19867 | Zip Disk 10-Pack | 99.95 |
| 47077 | Jaz 2GB External Drive | 399.95 |
| 47082 | Jaz 2GB 3-Disk Pack | 299.95 |
| 50564 | ZipPlus w/FREE Carrying Case | 169.95 |
| 46089 | Zip Drive SCSI Insider w/FREE Zip Zoom | 119.95 |

### La Cie

| | | |
|---|---|---|
| 59543 | 9.1GB HD Internal | $569 |
| 59542 | 9.1GB HD External | 649 |
| 58080 | 24X External CD-ROM Drive | 139 |
| 59402 | 4.0GB Apple Ext. Hard Drive | 419 |
| 38365 | External 2x6 Recordable Drive | 399 |

### Quantum

| | | |
|---|---|---|
| 50871 | 2.1GB Fireball SE Ultra SCSI Int HD | $219 |
| 50869 | 4.3GB Fireball SE Ultra SCSI Int HD | 289 |
| 50867 | 8.4GB Fireball SE Ultra SCSI Int HD | 489 |

### SyQuest

| | | |
|---|---|---|
| 48040 | SyJet 1.5GB External SCSI Drive | $299 |
| 32815 | SyJet 1.5GB Cartridge | 79.95 |
| 48947 | SyJet 1.5GB Cartridge 3-Pack | 199.95 |

### VST

| | | |
|---|---|---|
| 57228 | Internal Zip Drive for PowerBook G3 | $239.95 |
| 38024 | Internal Zip Drive for 3400/5300 | 229.95 |

## DIGITAL CAMERAS

SONY
Mavica FD71 Digital Camera
Take & store photos on standard 3.5" floppy disks!
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### Connectix

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|---|---|---|
| 26954 | Color QuickCam | $189.95 |

### Kodak

| | | |
|---|---|---|
| 52680 | DC200 Digital Camera (adapter reqd.) | $499 |
| 46426 | DC210 Zoom Digital Camera (adapter reqd.) | 699 |
| 56897 | DC220 Zoom Digital Camera | 799 |
| 56896 | DC260 Zoom Digital Camera | 999 |

### Nikon

| | | |
|---|---|---|
| 41600 | CoolPix 300 | $399 |
| 55074 | CoolPix 600 | 579.95 |
| 55075 | CoolPix 900 | 879.95 |

### Olympus

| | | |
|---|---|---|
| 46634 | D-220L Digital Camera | $299 |
| 46391 | D-320L Digital Camera | 499 |
| 55672 | D-340L Digital Camera | 599 |
| 47235 | D-500L Digital Camera | 699 |
| 47234 | D-600L Digital Camera | 999 |

### Polaroid

| | | |
|---|---|---|
| 35399 | PDC2000/40 Camera | $1499 |
| 49905 | PDC2000/60 Camera | 1899 |

### Sony

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|---|---|---|
| 59953 | Mavica FD71 Digital Camera | $699 |

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| 25696 | Mouse in a Box | $39.95 |
| 39536 | Kensington Orbit | 69.95 |
| 25697 | Turbo Mouse | 99.95 |

### Macally

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|---|---|---|
| 43892 | 2-Button Mouse | $32.95 |
| 43890 | New Wave Keyboard w/TouchPad | 72.95 |
| 57110 | 97 Keys Enhanced Keyboard | 44.95 |

### MDS

| | | |
|---|---|---|
| 21456 | 2-Button Ergonomic Mouse | $19.95 |
| 21459 | 2-Button Trackball | 32.95 |
| 22799 | 105-Key Soft-Touch Keyboard | 39.95 |
| 40380 | 2-Button Joystick | 34.95 |
| 40381 | Bat Wing GamePad | 26.95 |

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Mac OS

## iMac Software Includes:

- *Mac OS 8.1*
- *AppleWorks 5 (formerly ClarisWorks)*
- *Quicken Deluxe 98*
- *Kai's Photo Soap*
- *Microsoft Internet Explorer*
- *Microsoft Outlook Express 4.01*
- *FAXstf 5.0*
- *MDK from Interplay*
- *Pangea Software's Nanosaur*
- *Williams-Sonoma Guide to Good Cooking*
- *Earthlink's Total Access 2.01*

# New USB Products Arriving Daily!



Dozens of new peripheral products support USB and the iMac, including disk drive/storage devices from Imation, Iomega, LaCie, Newer Technology and SyQuest; printers from Canon, Epson, Hewlett-Packard and Alps; plus joysticks, game pads and digital cameras. Some even sport complementary colors and translucent plastics. And that's just the beginning! Manufacturers are readying a flood of new products that will take advantage of USB's speed and simplicity.

- *Attach your iMac to up to 127 devices at one time.*
- *Plug and unplug devices without restarting your iMac.*
- *Work faster, since USB connections are up to 10 times faster than SCSI connections!*

# But Wait, There's More!

Over 175 new software titles have been announced for the Macintosh since iMac was unveiled, including popular game titles such as Tomb Raider II, Age of Empires, Myth II: Soulblighter, StarCraft and Unreal, plus innovative applications such as CyberStudio Personal Edition, Cosmopolitan Virtual Makeover and Star Wars DroidWorks. Add to that such industry standard applications as Microsoft Office 98 and Adobe Photoshop 5, and you'll see why iMac is clearly the wave of the future! Call and order yours today!

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### 3Com

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|---|---|---|
| 54104 | Palm III w/FREE PalmMap Lite | $379.95 |
| 39153 | PalmPilot Pro w/FREE PalmMap Lite | 289.95 |
| 39154 | PalmPilot Modem | 129.95 |
| 36111 | PalmPilot Mac Pack | 14.95 |
| 33944 | PalmPilot Slim Leather Carrying Case | 19.95 |

## MEMORY

| | | |
|---|---|---|
| 100621 | iMac 32MB | $69.95 |
| 100626 | iMac 64MB | 139.95 |
| 100627 | iMac 128MB | 279.95 |
| 57248 | PowerBook G3 32MB (Wallstreet) | 69.95 |
| 57249 | PowerBook G3 64MB (Wallstreet) | 139.95 |
| 57250 | PowerBook G3 128MB (Wallstreet) | 279.95 |
| 38741 | PowerBook G3 16MB | 59.95 |
| 38743 | PowerBook G3 32MB | 99.95 |
| 49272 | PowerBook G3 64MB | 149.95 |
| 49167 | PowerBook G3 128MB | 299.95 |
| 43593 | PowerBook 2400 Series 32MB | 99.95 |
| 43594 | PowerBook 2400 Series 64MB | 159.95 |
| 38741 | PowerBook 3400 Series 16MB | 59.95 |
| 38742 | PowerBook 3400 Series 24MB | 89.95 |
| 38743 | PowerBook 3400 Series 32MB | 99.95 |
| 38744 | PowerBook 3400 Series 64MB | 159.95 |
| 38746 | PowerBook 3400 Series 128MB | 299.95 |
| 24151 | PowerBook 5300 Series 16MB | 69.95 |
| 24152 | PowerBook 5300 Series 32MB | 129.95 |
| 27819 | PowerBook 5300 Series 48MB | 179.95 |
| 27820 | PowerBook 5300 Series 56MB | 229.95 |
| 49124 | Power Mac G3 16MB | 29.95 |
| 49125 | Power Mac G3 32MB | 39.95 |
| 49127 | Power Mac G3 64MB | 89.95 |
| 49130 | Power Mac G3 128MB | 179.95 |
| 22999 | Power Mac 7200,7300,7500,7600 16MB | 29.95 |
| 23000 | Power Mac 7200,7300,7500,7600 32MB | 49.95 |
| 23001 | Power Mac 7200,7300,7500,7600 64MB | 79.95 |
| 22999 | Power Mac 8500,8600,9500,9600 16MB | 29.95 |
| 23000 | Power Mac 8500,8600,9500,9600 32MB | 49.95 |
| 23001 | Power Mac 8500,8600,9500,9600 64MB | 79.95 |

## MODEMS

### Best Data

| | | |
|---|---|---|
| 58886 | 56K Ext. Modem(After $20 mfr.'s mail-in rebate) | $69.95 |
| 56473 | 56K PCMCIA Card Modem | 139.95 |

### Diamond Multimedia

| | | |
|---|---|---|
| 53088 | Supra Express 56K V.90 Ext. Modem | $119.95 |

### Global Village

| | | |
|---|---|---|
| 57905 | 56K TelePort Ext. V.90 PLUS Mac OS8 | $179.95 |

### Zoom

| | | |
|---|---|---|
| 30842 | 33.6 External Faxmodem V34X Plus | $99.95 |
| 53670 | 56K Dualmode External Faxmodem | 139.95 |

### Simple Technology

| | | |
|---|---|---|
| 49812 | 56K Communicator PC Card Modem | $139.95 |

## MONITORS

### Hitachi

| | | |
|---|---|---|
| 43310 | MC6315 RasterOps 17" Monitor | $509 |
| 43348 | MC7515 RasterOps 19" Monitor | 829 |
| 33148 | MC801HR RasterOps 21" Monitor | 1399 |

### Mitsubishi

| | | |
|---|---|---|
| 51575 | Diamond Plus 70 17" Monitor | $469 |
| 36276 | Diamond Pro 91TXM 21" Monitor | 1149 |
| 44789 | Diamond Pro 1000 21" Monitor | 1299 |

### NEC

| | | |
|---|---|---|
| 43813 | A700 17" Monitor | $439 |
| 57869 | E900 19" Monitor | 539 |
| 46575 | E1100 21" Monitor | 999 |

### Sony

| | | |
|---|---|---|
| 48756 | CPD-200GS 17" Monitor | $619 |

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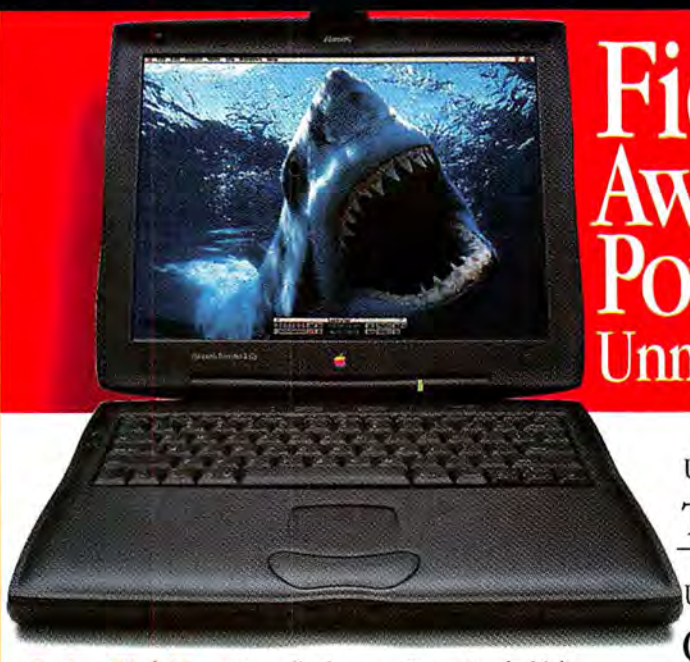


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Up to 7 Hours Average Battery Life
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Plus, a full range of networking and communications ports, including IrDA-standard- compliant infrared capability and a 24-bit S-Video-out.

*BusinessWeek Magazine* calls the new PowerBook G3 line

## *"the Lamborghini of laptops"*

– and with good reason! For starters, the new PowerBooks house the powerful G3 chip, which blows away the PC competition. But that's just the beginning. PowerBooks with 250MHz and 292MHz processors have system bus speeds of 83MHz – the fastest available on any Mac! Models with 13.3" or 14.1" active matrix displays support millions of colors on external as well as internal displays. And all PowerBook G3s have built-in 10BaseT Ethernet, and PC Card slots that are CardBus-compliant. Plus, the PowerBook G3s have a sleek new design. It's deeper and wider than previous models, but only 2 inches thick when closed!

### New Trackpad

*Solid-state Apple trackpad provides precise cursor control; sensing of movement and acceleration is adjustable through a control panel.*

### Advanced Keyboard

105-key capability

*The PowerBook uses a responsive premium scissors technology keyboard, making typing a pleasure.*

### The Mac's Back




*Port labels on the inside of the back cover make connecting a easy!*

1. *Stereo sound in*
2. *Stereo sound out*
3. *AC power*
4. *ADB*
5. *Serial (LocalTalk)*
6. *10BaseT Ethernet*
7. *SCSI (HDI-30 connector)*
8. *S-Video-out (available on models with 13.3" and 14.1" displays)*
9. *VGA video out*
10. *IrDA (4Mbps infrared)*

48749 GDM-400PS 19" Monitor ..... 669
48750 GDM-500PS 21" Monitor ..... 1399

**Viewsonic**

39386 Optiquest Q53 15" Monitor ..... $189
39387 Optiquest Q71 17" Monitor ..... 289
31254 G810 21" Monitor ..... 999
54160 Optiquest V115T 21" Monitor ..... 1079

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57993 Asanté Fast 10/100 PCI Adapter ..... 49.95
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43566 FriendlyNet 100BaseTX 8-Port Hub ..... 289.95
43569 FriendlyNet 100BaseTX 16-Port Hub ..... 599.95
38296 FriendlyNet 10BaseT Hub w/5 RJ45 Ports ..... 46.95
38297 FriendlyNet 10BaseT Hub w/8 RJ45 Ports ..... 54.95
49859 FriendlyNet 8+2 Switch for Small Networks ..... 289.95
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2580 FriendlyNet 10Base 2 Ethernet Adapter ..... 39.95
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56712 MacCon 10BaseT LC Ethernet Card ..... 79.95
17702 MicroPrint 10BaseT/5 to LocalTalk Converter ..... 229.95
56905 NetDoubler 1.5.1 ..... 69.95

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1504 Transceiver AAUI 10BaseT ..... 28.95
33812 EtherMac 10BaseT PCI Ethernet Adapter ..... 49.95

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**Apple**

51370 Mac OS 8.1 w/FREE Alley 19 Bowling ..... $99
51369 Mac OS 8.1 10-user ..... 589.95
43931 Apple Remote Access 3.0 Personal Server ..... 124.95
40300 Appleshare IP 5.0 Upgrade 4.x to 5.0 ..... 469

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57851 Adobe Image Ready w/Photoshop ..... $89.95
57850 Adobe Image Ready ..... 179.95
54672 Adobe Photoshop 5 Upgrade ..... 179.95
54673 Adobe Photoshop 5 ..... 599.95
55126 Adobe Premiere 5.0 Upgrade ..... 189.95
55124 Adobe Premiere 5.0 ..... 589.95
32844 Adobe PageMaker 6.5 ..... 549.95
40860 Adobe PageMill 2.0.1 ..... 94.95
44259 Adobe Acrobat 3.0.1 Upgrade ..... 54.95
40277 Adobe Illustrator 7 ..... 369.95
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46707 Spring Cleaning 2.0 ..... $49.95
52083 FlashBack 1.0 ..... 44.95*
47006 StuffIt Deluxe 4.5 ..... 78.95
44801 Private File ..... 47.95
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53302 Journeyman Project 3: Legacy of Time ..... 29.95
46770 Where in Time is Carmen Sandiego? ..... 33.95
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52981 QuicKeys PowerPack ..... 24.95
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|---|---|---|---|---|---|---|---|---|---|---|---|
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"Despite identical chip speeds, the Apple G3 processor outperforms the Pentium."
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48763 Bryce 3D ..... 179.95
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53475 Endnote 3.0 ..... $169.95

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52993 ObjectDancer 1.5 ..... $194.95

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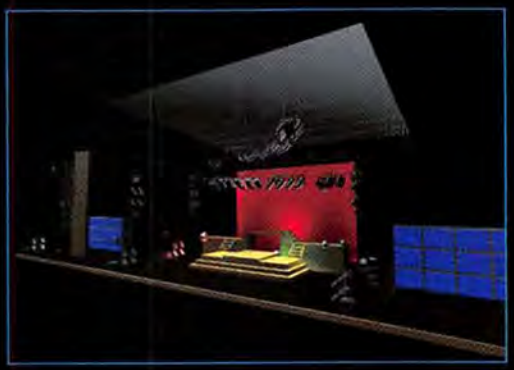
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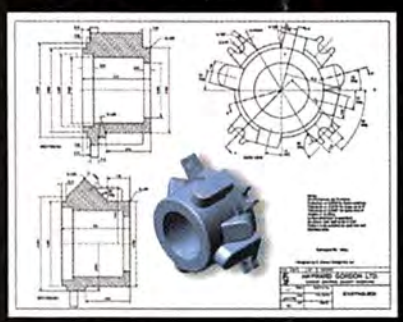
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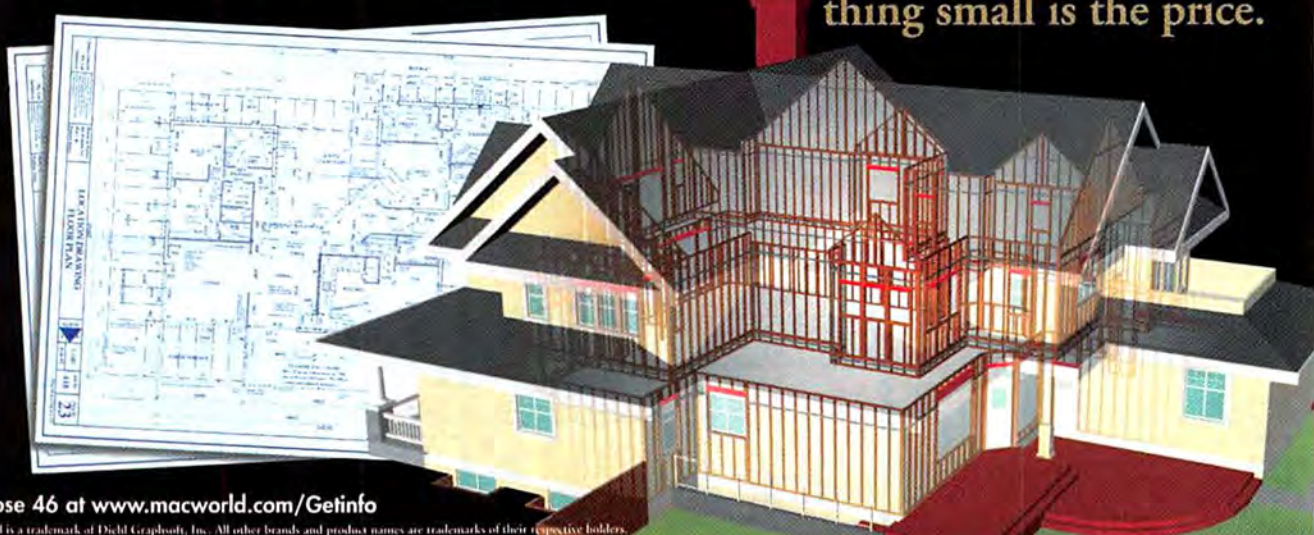
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# The Vision Thing

by Andrew Gore

## Old Ports for New

THE END OF ADB, MAC SERIAL, AND SCSI SIGNALS FASTER, EASIER MAC CONNECTIONS

UPON HEARING THAT Apple plans to replace the familiar serial, ADB, and SCSI ports with two new peripheral interfaces—USB and FireWire—on future Macs, I was reminded, as I often am when I try to think big about small things, of a joke: How many Microsoft engineers does it take to screw in a lightbulb? None. They just redefine darkness as the standard.

I like this joke not only because it bashes Windows but also because it says something important about the nature of standards. True, standards give us something that we can depend on and that developers can build on. The computer industry would not exist if it weren't for reliable standards.

But standards are perpetually behind the innovation curve. When a standard is shiny and new, it's a breakthrough with lots of hope for future growth. But as more and more products come to depend on the standard, it becomes harder for the standard to evolve.

Such was the fate of the command-line interface, data punch cards, and the Complex Instruction Set Computing processor—no matter what Intel says.

Eventually, the appeal of new technologies overwhelms the comfort of an old standard and the world lurches forward to a new standard, leaving the old one behind. Invariably there are people who invested heavily in the old standard and are also left behind. But the majority benefit from new features that give them power they never dreamed of having.

### Two Wild and Crazy Ports

By now you've probably heard about the Universal Serial Bus, or USB—the technology that is being introduced to the Mac market on the iMac and that has crowded out just about every other familiar Mac connector. What you might not have heard is that USB isn't simply a quirk of the iMac: it'll become the standard for low- and medium-speed connections on future Macs. And its serial sibling, FireWire, will become the Mac interface of choice for high-speed connections.

Apple's decision to use USB as the iMac's only peripheral interface (unless you count Ethernet) has led to more hand-wringing than an independent counsel's subpoena. Users have been worried that their old serial devices won't easily hook up to an iMac and that storage devices won't hook up at all.

They're right. USB is a powerful new standard for connecting printers, input devices, and modems to your computer, but it's *not* a panacea. It's much faster than current Mac serial technology, but you'll have to buy an adapter to get Mac serial devices to work with USB ports. And USB is simply not fast enough to support the high-speed peripherals we usually attach to our Macs via SCSI.



The truth is, the iMac is half-baked when it comes to connectivity. USB is a great start, but the story's not complete until you work FireWire into the routine. FireWire is a lot like USB in terms of flexibility and ease of use, but unlike USB, it's *really* fast. Speeds will start at 200 Mbps. In contrast, SCSI's theoretical maximum is 80 Mbps (and that is theoretical—it never actually gets there), and USB's is 12 Mbps.

### Take My Mac, Please

With USB and FireWire both in the picture, future Macs should be easier to use, more reliable, much faster, and ultimately less expensive. That's why Apple has chosen to abandon its old standards and make the move.

How does that help people who've already invested up to their eyeballs in a Mac that uses "old" interfaces? Don't worry. Even with Apple moving full steam ahead, it'll be years before you won't be able to get a printer or modem that offers an old-style port. And there will be FireWire and USB cards that will update your old Mac, if there's a USB- or FireWire-only device that you simply must have.

Maybe the best part of this decision is that Apple has the power to make USB and FireWire successes. USB was invented by Intel and a bunch of PC manufacturers, but it's been struggling for a couple of years to gain a foothold in the Windows market. There's no such thing as a USB-only PC. And USB has languished.

Since Apple controls all Mac hardware and the Mac OS, it can dictate when something becomes a standard. When Apple starts selling those USB-only iMacs by the truckload, it will have done something the Wintel world couldn't manage. USB will finally have momentum on its side. And that's no joke. **m**

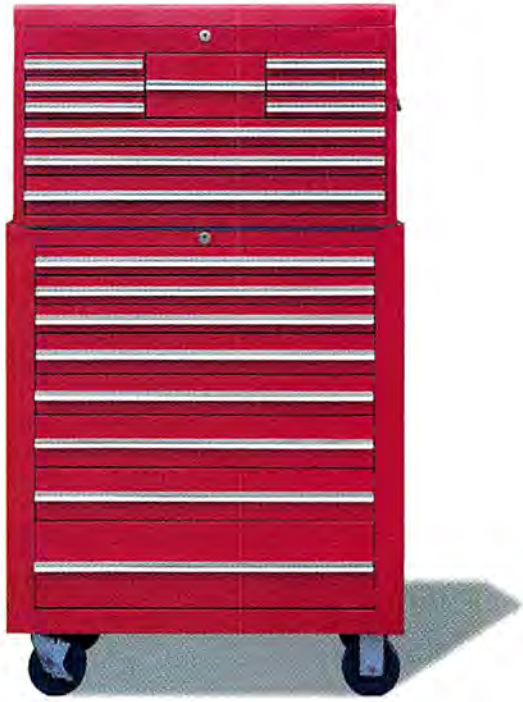
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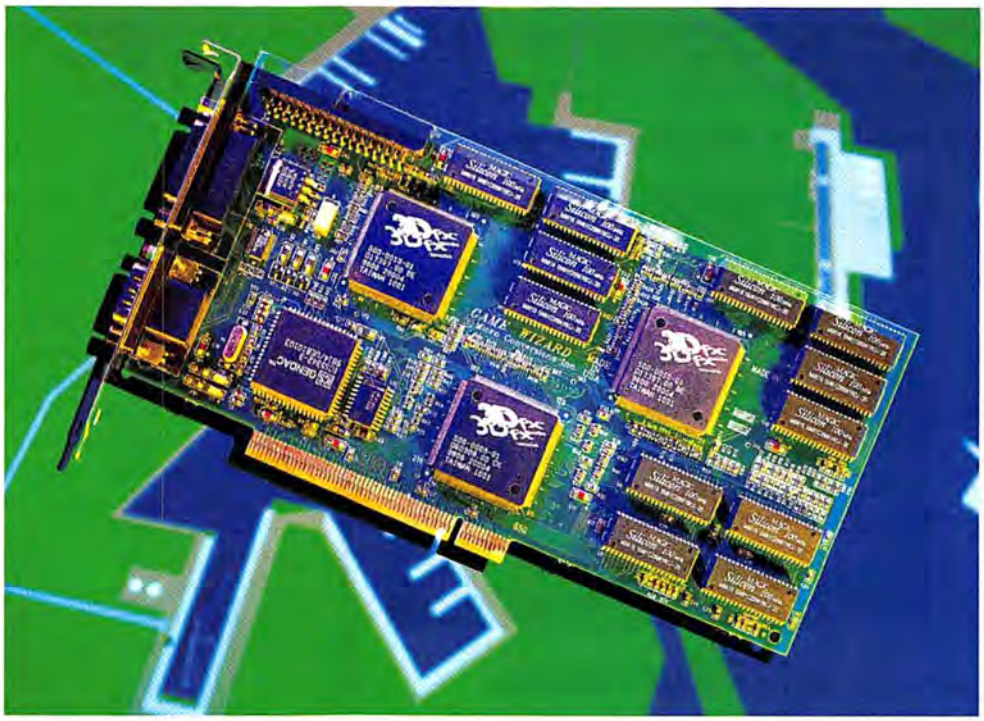
# News

entertainment

## Mac Gamers Await Voodoo 2 Boards

MICRO CONVERSIONS BRINGS NEW 3-D CHIP TO MACINTOSH

by Cameron Crotty



Apple's iMac may be hogging the spotlight, but the magic word for Macintosh gamers is Voodoo 2. Graphics-accelerator cards based on 3Dfx's next-generation chip set have been making waves in the PC market, and at least one company is now shipping a Mac board. Meanwhile, top Mac game vendors are tweaking their code to work with Voodoo 2.

Mac owners have always been able to rely on their machines' built-in display subsystems to handle the latest games, but that era is about to end. According to Bungie Software product manager Tuncer Deniz, "Bungie [games] will be hardware [accelerator]-only by late 1999, because the stuff just doesn't look as good [without one]." Other game developers have similar plans.

**The Good Life** Mac gamers have gotten a taste of the accelerated-3-D good life since TechWorks (512/794-8533, www.techworks.com) and VillageTronic (610/586-5701, www.villagetronic.com) shipped graphics cards based on 3Dfx's original Voodoo chip set. Games written to the 3Dfx Glide API, when running on Macs equipped with a Voodoo graphics card, offer smoother, more realistic textures and are much faster than games on unaccelerated Macs (see "Quick on the Draw," August 1998).

**New Voodoo** Voodoo 2 adds a second texture-processing chip, and the results are eye-popping. According to several top Mac developers, Voodoo 2 boards offer at least twice the speed of the original Voodoo accelerators.

So far, only one manufacturer, Micro Conversions (817/468-9922, www.microconversions.com), offers a Voodoo 2–based Mac accelerator. The company, which previously built Mac display cards for Storm and Mirror, is stepping out on its own with the GameWizard; an 8MB version ($299) and a 12MB version ($349) are currently available.

**Trouble for TechWorks** TechWorks says that it may offer a Voodoo 2 board for the Mac, but don't hold your breath. "It's difficult for us to justify [releasing a Macintosh 3-D game card]," says a TechWorks spokesperson.

The original TechWorks 3D relied on designs and software created by 3Dfx, an approach that caused trouble for the company. Mac gamers quickly discovered that Mac

*continues*

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software drivers—available from the TechWorks Web site—could be used with most PCI Voodoo boards for PCs, boards that are substantially less expensive than TechWorks' Mac version. Users would purchase the cheaper boards, plug them into their Macs, and use them with the TechWorks drivers.

Micro Conversions claims that it has an advantage because it has developed its own board and software drivers. Micro Conversions' Mac drivers will work only with the GameWizard board.

**Mandate for Acceleration** Meanwhile, Apple's iMac, for all its appeal as a consumer machine, does not use the Voodoo 2 chip. Instead, the computer has a built-in Rage IIc chip from ATI, which puts the iMac seriously behind the times in the 3-D–acceleration game. ATI's Rage IIc provides some boost, but it's not even as fast as the Rage Pro chip set—which is roughly comparable to the *original* Voodoo chip set.

Because the iMac lacks PCI slots, you won't be able to install the Micro Conversions boards. As a result, serious Mac gamers may opt for desktop Macs with free PCI slots over the iMac.

ATI confirms that a more advanced chip set (which will be competitive with Voodoo 2) is in the works; readers should look for cards based on the new silicon to be available by the end of this year.



## A Hot Rod for Photoshop

ADOBE PHOTOSHOP USERS HAVE A NEW TOOL AGAINST unwieldy files. Grand Vitesse Systems' (415/777-0320, www.gvsnet.com) GVS9000 Photo Retouching Workstation (PRW) combines a Power Macintosh 9600 and Newer Technologies' 300MHz G3 processor upgrade to create a $24,450 workstation that cuts down the time required to flip, retouch, and rotate Photoshop images. The GVS9000 PRW, scheduled to ship by the time you read this, includes 1.5GB of RAM, an internal 45GB four-drive RAID system, dual graphics accelerators, and a Sony GDM-W900 25-inch monitor. Grande Vitesse Systems has also added its own brackets, firmware, and fan. The system is available in a variety of configurations to meet the needs of graphics professionals. Racing stripes are optional.—MICHAEL GOWAN

industry

# Apple and Microsoft Spar on Multimedia

JUSTICE DEPARTMENT MAY TAKE ACTION

by John Batteiger

Apple's cozy relationship with Microsoft could be taking a turn for the worse after recent disagreements over the development of multimedia software for Windows—a sticking point that may be at the heart of a new federal probe into Microsoft business practices.

The U.S. Department of Justice is investigating allegations that Microsoft tried to persuade Apple to stay out of the consumer market for multimedia software. Investigators reportedly are studying information obtained from Apple indicating that Microsoft executives proposed three times—most recently in March—that Apple retreat from its plans for the Windows multimedia market and leave that field to Microsoft, in exchange for an endorsement of Apple software tools.

Apple reportedly rejected the proposal.

Apple spokeswoman Katie Cotton confirmed that Apple has answered subpoenas from both Microsoft and federal investigators in connection with the wide-ranging federal probe. "And we're complying fully," she said.

**Agree and Disagree** "Apple has enjoyed a partnership with Microsoft that produced lots of great products in the past year, and as partners we agree on many issues," Cotton said. "And we also disagree from time to time. This is something that is to be expected in a professional partnership, and multimedia is one area where Microsoft and Apple have some disagreements."

Cotton said that Apple and Microsoft "have a good relationship, and we're trying to work together in a professional manner."

**QuickTime to Blame?** Observers have speculated that Microsoft's action against Apple was prompted by QuickTime 3, the latest version of Apple's multimedia architecture. Version 3, which Apple shipped in April, marks the first QuickTime release to offer Windows and Mac users identical sets of features.

The cross-platform QuickTime goes head-to-head with Microsoft technologies such as DirectX; furthermore, forthcoming Internet streaming capabilities that are due to appear in QuickTime later this year will position the technology to vie with Microsoft's Advanced Streaming Format.

systems

# A Bump in the FlashPath

SOFTWARE HURDLES KEEP TOSHIBA FROM OFFERING MAC ADAPTER

by Stephen Beale

Toshiba's FlashPath adapter, which lets you read digital-camera images through a computer's floppy-disk drive, has hit an unexpected bump on the road to Mac compatibility.

The $99 adapter, available since March for the PC, was supposed to ship for the Mac

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in mid-May. However, SmartDisk, the Toshiba-owned company that developed the technology, says it has had trouble writing the software drivers that will enable the adapter to work with Macintosh disk drives.

FlashPath (see "The Flash Is in the Floppy," *News*, July 1998) was designed for use with Toshiba's SmartMedia cards—also known as Solid State Floppy Disk Cards—which are used as storage media in digital cameras from Toshiba, Olympus, Fuji, and other vendors.

**Read First** SmartDisk now says that a beta version of the Mac adapter will be available by the time you read this, with the first production units scheduled to ship by the end of September. At first, the Mac driver will let you read data only from the disk; software with read/write capability will be available after the product's initial release. The PC version already has read/write capability.

The Mac version's delay has caused some finger-pointing at Toshiba. Mac users inquiring about the FlashPath adapter received e-mail replies from Toshiba blaming the delay on lack of cooperation from Apple. However, Quresh Sachee, vice president of marketing for SmartDisk—a joint venture between Toshiba and Fischer International Systems—says the development problems were internal and that Apple was not to blame.

The adapter resembles a floppy disk but features a slot for the SmartMedia cards plus a magnetic strip for transferring data to the drive head. When you insert the adapter into a disk drive, the computer sees it as a floppy disk and lets you copy data from the SmartMedia card. Without FlashPath, you need a PC Card adapter—or a sometimes painfully slow serial connection—to copy the images.

KEVIN CANDLAND

systems

# Floodgates Open for CPU Upgrades

VENDORS UNVEIL NEW G3 UPGRADE CARDS

by Macworld Staff

Thanks to a recent spate of G3 CPU cards, users of older Mac systems now have more upgrade options than ever before.

Mactell (512/323-6000, www.mactell.com), PowerLogix (512/795-2978, www.powerlogix.com), and Sonnet Technologies (949/261-2800, www.sonnettech.com) have added new cards to their product lines, while a fourth company, Vimage (877/484-6243, www.vimagestore.com), has entered the Mac market with a series of accelerators for desktop Macs and PowerBooks.

These CPU upgrades probably won't let you run Apple's next-generation Mac OS X—which will be tied to the G3 Mac's motherboard architecture—but they will boost the speed of your current Mac applications.

**Mactell** Mactell announced that it is shipping three 300MHz G3 upgrades for use with older G3 Power Macs. The cards are available with multiple cache options, at prices ranging from $549 to $1,795. Mactell has also released the $549 G-Max card, which has a 240MHz G3 CPU, for use with the Umax SuperMac C500 and C600 Macintosh clones.

**PowerLogix** The company's PowerForce G3 ZIF, which is scheduled to ship by the time you read this, plugs into the Zero Insertion Force socket on 233MHz, 266MHz, and 300MHz G3 Power Macs. PowerLogix says the card will initially feature a 300MHz G3 CPU, but future versions will offer speeds up to 366MHz. Pricing has not yet been set.

**Sonnet Technologies** Sonnet announced that it is shipping the third in its Crescendo line of upgrade cards for Power Macs with NuBus.

The $800 Crescendo G3 266 features a 266MHz G3 plus a 1MB backside cache running at 133MHz. The card works with most configurations of the Power Macintosh 6100, 7100, 8100, and 8115 and the Workgroup Server 6150, 8150, and 9150. Exceptions include the Power Mac 6100/60 and Workgroup Server 6150/60. A $100 adapter kit lets you attach a PDS video card or an AV card to a pass-through connector on the board.

**Vimage** Vimage, a Japanese company that opened a U.S. office in June, has entered the Mac market with a series of CPU upgrades for desktop and laptop Macs.

The VPower G3 works with most Power Macintosh 7300, 7500, 7600, 8500, 8600, 9500, and 9600 models. It's



## Binding System Gets Some Backbone

THE LATEST INK-JET AND LASER PRINTERS PRODUCE great-looking output, but what if you want to bind those pages into a book? Powis Parker (510/848-2463, www.powis.com), a developer of document-binding systems, has introduced the PowisPrinter, a $2,495 device that produces printed, foil-embossed spines for use with the company's FastBack desktop binder. The printer includes a built-in keyboard, but you can also connect it to a Mac or PC; the company promises Mac software for the printer within the next two months. Spines are available in 16 colors; foil is available in gold, silver, black, white, red, blue, and green.

The PowisPrinter can be connected directly to the FastBack system, which uses a heating element to bind pages to a strip of thermal plastic in the spine. The $1,895 Model 11 binds up to 125 letter-size sheets; the $3,495 Model 15 binds up to 350 legal-size pages.—MACWORLD STAFF

available in three configurations: the 233MHz G3 sells for $499, the 266MHz G3 for $799, and the 300MHz G3 for $1,099. The VPower PB1400 G3 for Apple's PowerBook 1400 is available in a 233MHz version for $699 and a 266MHz version for $1,099.

systems

# AppleScript Users Create Rating System

APPLICATIONS RATED FOR SCRIPTABILITY

by Stephen Beale

Apple Computer's AppleScript technology is a powerful tool for automating Mac applications. However, developers have not implemented the scripting language in a consistent manner, and few programs—if any—take full advantage of the technology. Hoping to change this, three AppleScript users—working independently of Apple—have developed a system that rates applications for their support of the scripting language.

**Quantity and Quality** The rating system, known as the AppleScript Scorecard, awards up to 100 points to Mac applications, based on the number of AppleScript features supported and how well those features are implemented.

For example, a program earns up to 5 points if you can create valid scripts by recording a series of actions. It earns another 5 points if scripts written by the user can be run from the menu bar. Programs get up to 25 points if they support Apple's Object Model, which provides a standard method for handling elements within applications and documents.

The total score is then divided by 20 to provide a *scripts* rating—on a scale of 1 to 5, in half-script increments. For example, if an application earns 70 points, it has a rating of 3.5 scripts.

**High Hopes** The scorecard is the brainchild of Bill Cheeseman, a Massachusetts attorney; Joel Smith, a Macintosh consultant from Charlottesville, Virginia; and Cal Simone, founder of Main Event, a developer of AppleScript authoring tools. The trio hopes to rate five to ten Mac applications per month and post the scores on a Web page, a beta version of which can be found at www.mainevent.com/scorecard.

One goal of the effort, Simone says, is to provide users with a consistent benchmark for judging the scriptability of Mac applications. He also hopes to "shame" Mac developers into providing better implementation of AppleScript within their software. Simone presented the rating system during a session at Apple's recent Worldwide Developers Conference.




**Poor Implementation** At present, Simone says, few Mac applications do a good job of supporting AppleScript. "No one gets a 5 [-script rating]," he says, and only a handful would earn a 4.

multimedia

# Video and 3-D Highlight Siggraph

MAC HAS LOW-KEY ROLE AT GRAPHICS SHOW

by Macworld Staff

Siggraph can be a pretty depressing place for Macintosh loyalists. The trade show, held from July 19 to 24 in Orlando, Florida, focused on high-end computer-graphics applications for scientists, engineers, and film- and broadcast-production professionals. It's a market dominated by Unix and Windows NT workstations, and the Siggraph product mix tends to reflect this bias.

Nevertheless, several vendors used the event to introduce new Mac products.

• NewTek (210/370-8000, www.newtek.com) announced that it has licensed OpenGL for the Mac from Conix Enterprises and plans to incorporate it into the Mac versions of LightWave 3D and Inspire 3D. OpenGL is an industry-standard set of 3-D–graphics routines. Many developers say that it offers faster performance than Apple's QuickDraw 3D RAVE technology (see "Quick on the Draw," August 1998).

• Maxon Computer (805/484-5804, www.cinema4dusa.com) announced a free update to Cinema 4D XL, its $1,995 3-D–modeling, –rendering, and –animation software. New features in version 5.2 include a revised function-curve editor, improved handling of alpha channels, and new texture-mapping techniques designed to eliminate animation artifacts. In addition, Integrated Computing Engines (781/768-2300, www.iced.com) announced that it will offer a version of its BlueICE acceleration hardware for Cinema 4D XL.

• DigiEffects (415/841-9901, www.digieffects.com) has announced new versions of its Aurorix and Berserk special-effects plug-ins that work with Avid Technology's Media Composer and Xpress digital-video–editing systems. Both packages were previously available only for Adobe After Effects. Aurorix 2 AVX features lighting, distortion, and texture effects; Berserk AVX provides naturalistic, organic, and distortion effects. Each sells for $500. Integrated Computing Engines announced that it is shipping a $3,000 hardware-accelerated version of DigiEffects' CineLook, another special-effects package for the Avid systems.

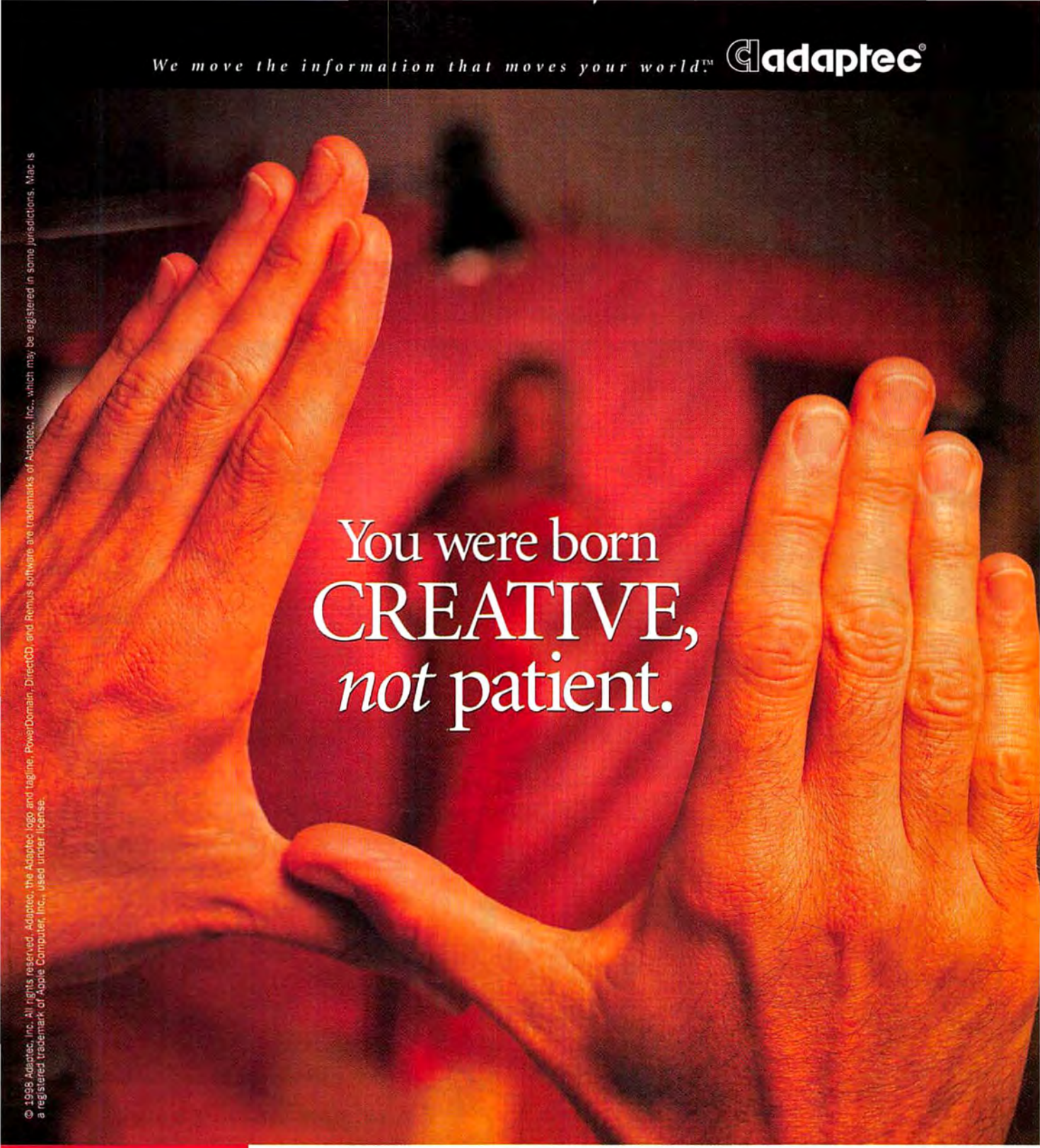
• Videonics (408/866-8300, www.videonics.com) announced that Effetto Pronto, its Mac-based digital-video–editing software, will work with After Effects plug-ins from DigiEffects.

• Artel Software (617/451-9900, www.borisfx.com) announced that Boris FX, its package of special-effects plug-ins for Avid digital-video systems, now works with other companies' After Effects plug-ins. This will allow Avid users to run After Effects plug-ins from DigiEffects, MetaCreations, Alien Skin Software, and other vendors. Boris FX is also available in an After Effects version.

• AutoMedia (www.automedi.com) showed AutoMasker 2.0, a $995 video-masking plug-in for After Effects, previously available only for Windows. The plug-in lets you isolate objects across multiple frames for special-effects work.

JAMES YANG

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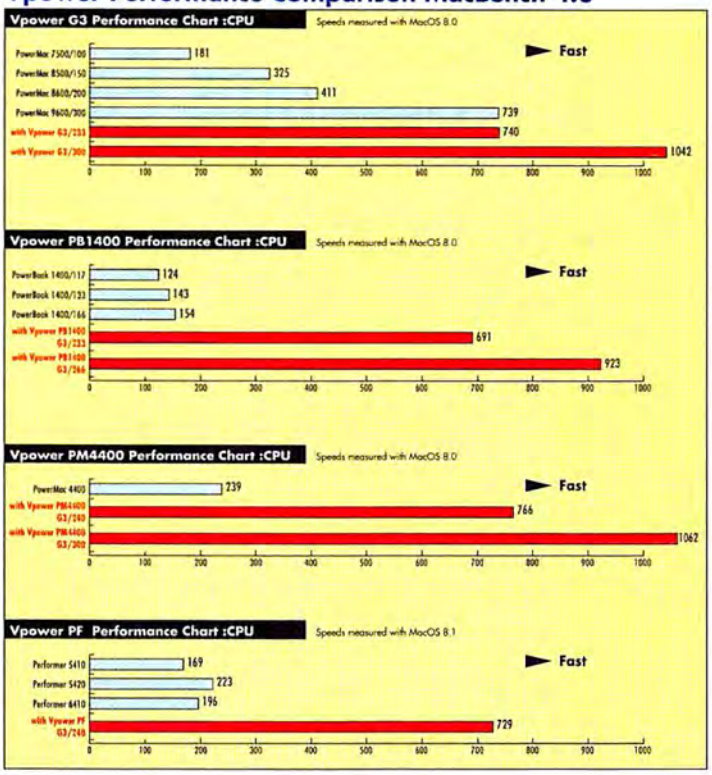
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## Vpower Performance Comparison MacBench 4.0




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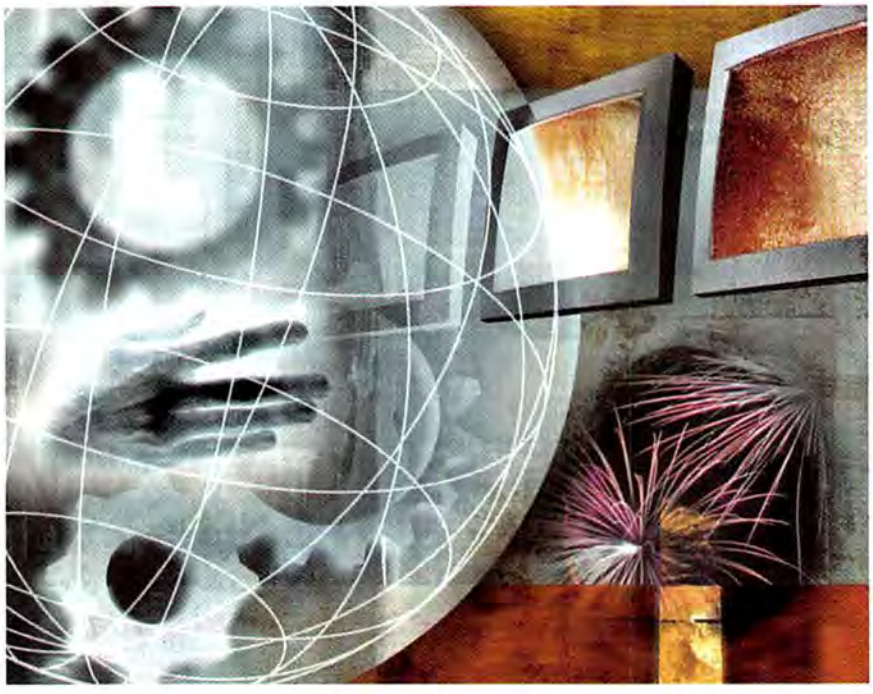
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# Reviews

# Web-Graphics Editors

AFFORDABLE APPLICATIONS DESIGNED SPECIFICALLY FOR WEB OUTPUT



JOHN RITTER

FACE THE FACTS: IF PUBLISHING and Web design were siblings, Web design would be the younger kid forced to wear all the hand-me-downs. The graphics tools that have become Web standards are merely secondhand prepress applications that artists have retrofitted with third-party plug-ins.

But after years of leaving us to piece together our own tools, computer-graphics standard-bearers Adobe and Macromedia have finally come to the aid of Web artists. Adobe ImageReady is so gung ho about screen art that it entirely omits any mention of CMYK, resolution, or page size. Heck, the program doesn't even have a Print command. Macromedia Fireworks lets you assign URLs to objects, export JavaScript rollover buttons, and simultaneously compare the effects of multiple GIF and JPEG settings on a single graphic. Both programs have their share of irritating flaws but are sufficiently capable to keep you productive. And by comparison with Photoshop and FreeHand, ImageReady and Fireworks are refreshingly affordable.

### Pixels to Pixels

Like Photoshop, ImageReady is a pixel-based image editor, ensuring that what you see comes as close to what you get as you could hope for. You start with screen pixels, you edit in screen pixels, and you export to screen pixels. Also like Photoshop, ImageReady lets you assign elements to independent layers. ImageReady goes so far as to share Photoshop's native file format, so you can trade images between the two programs with layers intact. And as in Photoshop 5, text in ImageReady is editable. You can't mix and match styles and sizes inside a single text block—as you can in Photoshop 5—but you can correct misspellings and modify formatting from one session to the next.

Strangely, ImageReady can't edit text created in Photoshop, nor can Photoshop edit type from ImageReady. Also perplexing, ImageReady recognizes Photoshop 5's drop shadows and other layer effects but doesn't let you modify them. Finally, ImageReady's inexplicable lack of a rubber-stamp tool makes image retouching all but impossible.

### The Challenge of Objects

Fireworks blends bitmaps and vectors to create an environment that is at once more flexible than ImageReady's and

REAL PRODUCTS REAL RATINGS
Reviews you can trust: Macworld rates only final shipping products, not prototypes. What we review is what you can actually buy.
OUTSTANDING: ♦♦♦♦♦ VERY GOOD: ♦♦♦♦ GOOD: ♦♦♦ FLAWED: ♦♦ UNACCEPTABLE: ♦

more challenging. Images imported to Fireworks consist of Background and Foreground layers. You click on the Background layer to make pixel-level edits and on the Foreground layer to create and edit vector objects. A brush stroke applied to the Background layer is composed of static pixels; a brush stroke applied to the Foreground layer is an editable path. Fireworks doesn't always make the most-logical use of this approach—you have to switch to the Foreground layer to crop the image or otherwise modify the canvas size—but once you get the hang of it, you can combine bitmaps and objects to create a boundless variety of graphics.

The advantage of the object-oriented approach becomes all the more apparent when you're editing text. Unlike ImageReady, Fireworks lets you apply various formatting attributes inside a text block. Fireworks can also automatically wrap words and join type to a curve, something neither ImageReady nor Photoshop can do. But Fireworks proves a real klutz when it comes to pixel-level editing. The only way to resample an image on the Background layer is to export it. The Unsharp Mask and Gaussian Blur dialog boxes rely on thumbnail-size previews and ignore numeric entries. And when you're using the marquee tool, the selection outline shifts up and to the left one pixel after you release the mouse button.

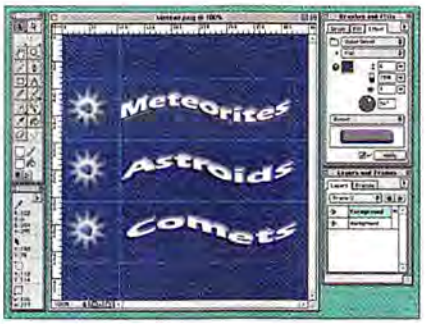
### Optimizing and Animating

Although ImageReady and Fireworks occasionally falter in the creation department, they shine when preparing images for the Web, particularly when you're previewing and exporting GIF, JPEG, or PNG files. In ImageReady, you specify output attributes in a palette and then preview them directly in the image window. Fireworks lets you compare as many as four independent collections of settings side by side inside a scalable dialog box.




**Optimize on the Fly** ImageReady lets you preview the effects of GIF, JPEG, or PNG attributes specified in the Optimize palette.

But ImageReady proves the superior tool for exporting, allowing you to edit an image and immediately preview the effect without having to visit and revisit a dialog box. And although both programs provide batch processing, ImageReady lets you save your format settings to the desktop as a "droplet" file. When you drag a handful of files onto the droplet, ImageReady automatically converts the images, jettisoning illegal characters and renaming files to avoid overwriting the originals.




**No-Rules Text Effects** Because Fireworks doesn't limit itself to PostScript-compatible output, you can combine object-oriented and pixel-based effects.

ImageReady provides a handy Animation palette for managing frames. Each frame can contain multiple layers, and with the help of the Tween command, you can make the layers move and fade across frames, even if you have little or no animation experience. Best of all, you can preview the final GIF animation right in the image window.

Fireworks lets you rotate or scale an object as it moves across the screen, but the program's animation features are far more difficult to use. To automate motion and fade with the Tween feature, you identify the animated object as a "symbol" and ask Fireworks to distribute the tweened instances across frames, a needlessly complex procedure. And of course, you can preview the animation only by entering the Export dialog box.

ImageReady pretty much stops at optimization and animation, but Fireworks goes several steps further. Because it can automatically generate HTML and JavaScript, Fireworks lets you animate rollover buttons and build client-side image maps, saving the necessary code to an extra text file. If you don't want one big image map, you can slice and dice the image along guidelines, with the option of coding some areas as links, making others rollovers, and leaving the rest static.

But all these features come at a price. Even with my head buried in the Fireworks manual, many of my questions went unanswered until I resorted to trial-and-error experimentation. And although Fireworks displays tips when your cursor hovers over an icon, there are no tips for the main tools—the very ones I needed help with the most. By contrast, ImageReady is almost transparently simple. If you have prior experience with Photoshop, you should be up and running with ImageReady in a matter of minutes.

### Macworld's Buying Advice

If you want a program that will make up for Photoshop's obvious deficits and you need to create Web artwork immediately, buy ImageReady. For those who are more interested in purchasing an application that goes a few steps further and are willing to spend time adapting, Fireworks is the more powerful tool. Not only does Fireworks share a few of FreeHand's shortcuts and interface tricks, but—like FreeHand—it also sacrifices ease of use in favor of a truckload of features that'll keep you on your toes.—DEKE McCLELLAND

#### Fireworks

**RATING:** ♦♦♦½ **PROS:** Editable brush strokes and text; ability to preview multiple file format settings side by side; automatically generates JavaScript rollovers. **CONS:** Flaky image-editing functions; have to enter dialog box to preview animations; difficult to use. **COMPANY:** Macromedia (415/252-2000, www.macromedia.com). **COMPANY'S ESTIMATED PRICE:** $299.

#### ImageReady

**RATING:** ♦♦♦ **PROS:** Familiar Photoshop interface; straightforward batch-processing and animation functions. **CONS:** Can't edit Photoshop text; no rubber-stamp tool. **COMPANY:** Adobe Systems (415/961-4400, www.adobe.com). **COMPANY'S ESTIMATED PRICE:** $199.

# QuickTime VR Tools

## SIMPLIFIED PANORAMA AND OBJECT-MOVIE CREATION

DESKTOP VIRTUAL REALITY IS getting more real all the time. Last year saw the first generation of programs aimed at simplifying the creation of QuickTime VR movies (see *Reviews*, November 1997). Not long after, Apple leapfrogged the competition with its own QuickTime VR Authoring Studio (see *Reviews*, March 1998).

Happily, Apple's tool didn't send third-party programs into virtual retirement. The latest round of QuickTime VR tools brings programs aimed at both panorama and object-movie production. (Panoramas enable you to navigate within a 360-degree scene, whereas object movies let you rotate and examine objects.) I tested two new panorama producers: Roundabout Logic's Nodester 1.5 and PictureWorks' Spin Panorama 2.0. For object moviemaking, I tested PictureWorks' Spin PhotoObject 1.0 and Roundabout Logic's Widgetizer 1.0. None of these programs outperforms Apple's QuickTime VR Authoring Studio, but each has advantages that make it appealing for some jobs or budgets.

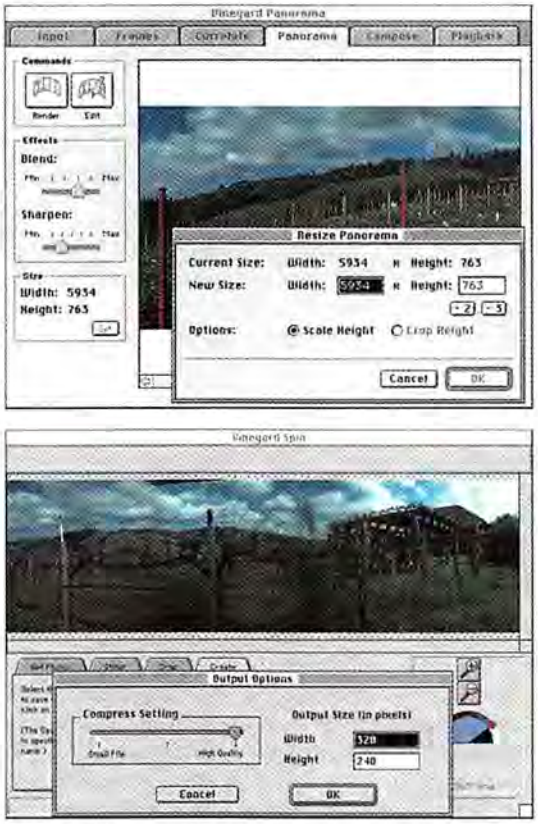
### The Panorama Landscape

Like Apple's Authoring Studio, both Nodester and Spin Panorama assemble, or *stitch*, a series of photographs into a seamless, navigable panorama. But where Nodester provides a full complement of tweaking tools, Spin Panorama is aimed at novices who don't want to sweat the details. It's the easiest program of the bunch—and the most limited.

Nodester 1.5 builds on its predecessor's strengths. A straightforward interface walks you through each step in making a panorama: specifying the characteristics of the lens used to photograph the original scene, importing images, stitching them, and then compressing the final panorama movie (see "Making VR"). A built-in image editor lets you clean up images without extra trips into Adobe Photoshop.

Nodester 1.5 lets you use Photoshop acquire plug-ins to import images. The program also includes more than 200 stationery documents containing presets for common lenses and for most popular digital cameras and can import images in any QuickTime 3–compatible format. And speaking of QuickTime 3, Nodester includes QuickTime 3 Pro, the $30 version that sports additional authoring features (see "QuickTime Goes Pro," September 1998); Spin Panorama doesn't.

One Nodester enhancement helps Web producers slim down panoramas for faster downloading. New buttons let you reduce a panorama's file size by one-half or two-thirds with a single mouse-click; Nodester displays a panorama's approximate file size as you work. Spin Panorama and Apple's Authoring Studio lack these conveniences.




**Making VR** Nodester 1.5 (top) makes it easy to resize a stitched image for faster Web downloading. Spin Panorama 2.0 (bottom) provides minimal control over movie-compression settings.

Nodester 1.5 is compatible with QuickTime VR 2.0 (the current version, included with QuickTime 3), but it doesn't support some of the best features of the new QuickTime browser plug-in. Nodester can't, for example, create reference movies or low-resolution, streaming previews. Creating fully Web-optimized panoramas still means grappling with utilities such as Apple's MoviePlayer Pro 3.0 and MakeRefMovie (see "Optimize Web Video for QuickTime 3," *Create*, August 1998).

As for Spin Panorama, the big news in version 2.0 is a feature the competition has had from day one: automatic stitching. Spin Panorama can now identify the areas of overlap between each image on its own. The manual-stitching tools from version 1.0 remain, but you don't have to use them unless Spin's automatic stitcher fails to stitch correctly—which it sometimes does.

Spin Panorama offers only a few menu commands and a simple, one-window interface. But this simplicity comes at the price of control. You can't adjust movie-playback settings or even specify which QuickTime compressor to use. Spin Panorama can't create partial panoramas (ones that show less than a full 360 degrees), nor does it provide features for creating clickable hot spots (which, among other things, can enable users to jump to other panoramas).

For serious panographers, the choice is clearly between Nodester and Apple's QuickTime VR Authoring Studio. Apple's Authoring Studio is the only QuickTime VR tool that can create a *multinode* panorama—a single movie file containing numerous panoramas linked by hot spots. Apple's program also provides better features for managing large VR-production projects. However, it lacks Nodester's built-in image editor, quick-resizing buttons, and file-size display.

Apple's QuickTime VR Authoring Studio also costs $395, against Nodester's $149.95. But whereas Nodester is a panorama specialist, Apple's Authoring Studio can also create object movies—the next stop on our virtual tour.

### Object Lessons

Like their panoramic counterparts, PictureWorks' Spin PhotoObject 1.0 and

Roundabout Logic's Widgetizer 1.0 fall at opposite ends of the capabilities spectrum. Each also offers its own surprises: Widgetizer is a powerhouse moviemaker with some feature lapses, and Spin PhotoObject is a featherweight with some useful features the competition lacks.

To make an object movie, you generally place an object on a turntable and snap a series of images, rotating the object between snaps. You can also make a *multirow* object movie, which enables users to look at the object from above and below as well as rotate it. Like Apple's QuickTime VR Authoring Studio, Widgetizer 1.0 can create both types of object movies. Spin PhotoObject is limited to single-row movies.

For acquiring original images, Widgetizer can import image files, control a Kaidan (215/364-1778, www.kaidan.com) motorized object-movie turntable (see "Completing Your Virtual Toolbox"), and grab frames from a video camera. But unlike Apple's Authoring Studio, Widgetizer can't import conventional (linear) QuickTime movies—a surprising omission that makes converting linear movies to object movies a labor-intensive chore. Spin PhotoObject can import existing images only; it can't import linear movies or grab video frames.

Like their panoramic cousins, Widgetizer and Spin PhotoObject provide tabbed windows that step you through the production process. And Widgetizer, like Nodester, includes a simple image editor.

Widgetizer is unique in supporting soundtracks for object movies: you can assign a different sound to each object image and control the volume and left/right stereo balance of each sound. This enables you to add audio annotations or sound effects to each view of an object.

An important part of object-movie production involves trimming file sizes by removing unneeded areas of original images. For example, when making an object movie, you crop the movie so that its dimensions are only slightly larger than the object—an area where the lowly Spin PhotoObject pulls ahead of not only Widgetizer but also Apple's Authoring Studio. Spin PhotoObject is the only program that enables you to crop the movie *before* saving. Other programs force you to use a separate utility, such as Terran Interactive's Media Cleaner Pro (see *Reviews*, October 1997), to crop.

Spin PhotoObject can also export a finished object movie as an animated GIF or as a set of PICT or JPEG images; Widgetizer saves in QuickTime VR format only. But like Spin Panorama, Spin PhotoObject doesn't allow you to choose QuickTime compressors.

In the end, Widgetizer runs circles around Spin PhotoObject, but Widgetizer needs cropping features and the ability to import linear movies.

### Macworld's Buying Advice

Their lean capabilities make PictureWorks' Spin Panorama and Spin PhotoObject unsuitable for professional VR production, but their $50 prices and simplicity will appeal to beginners. If you want to tinker with QuickTime VR without wading into technicalities or spending a lot, consider these PictureWorks programs—but expect to outgrow them.

Nodester 1.5's quick-resize buttons and low price make it a better choice than Apple's QuickTime VR Authoring Studio for creating single-node panoramas that are destined for the Web.

Roundabout Logic sells a Nodester/Widgetizer bundle for $249.95—about $150 less than Apple's QuickTime VR Authoring Studio. Should you consider this bundle instead of Apple's tool? Not unless price is your key criterion. Although Nodester and Widgetizer have appealing attributes, Apple's QuickTime VR Authoring Studio remains the best choice for VR professionals.

But for Web producers and multimedia authors who create QuickTime VR movies only occasionally, Roundabout Logic's tools warrant a long look. Thoughtfully designed and reasonably priced, Nodester and Widgetizer are capable vehicles for entering the virtual world.—JIM HEID

### Completing Your Virtual Toolbox

For reviews of Kaidan's KiWi+, a motorized object-movie turntable, and EnRoute QuickStitch, a non-QuickTime VR stitching program, refer to **www.macworld.com/more/** on Macworld Online.

## QuickTime VR Tools: Making the Rounds

| Product | Mouse Rating | Company | Pros | Cons | List Price |
|---|---|---|---|---|---|
| **Panorama Tools** | | | | | |
| Nodester 1.5 | 4 | Roundabout Logic (407/327-4500, www.roundaboutlogic.com) | Elegant interface; convenient Web optimizing features. | Can't create streaming previews or multinode movies. | $149.95* |
| Spin Panorama 2.0 | 2½ | PictureWorks (510/855-2001, www.pictureworks.com) | Simple, inexpensive; CD includes Windows versions. | Mediocre stitching results; can't create partial panoramas; no choice of QuickTime compressor. | $49.95 |
| **Object-Movie Tools** | | | | | |
| Spin PhotoObject 1.0 | 3½ | PictureWorks (510/855-2001, www.pictureworks.com) | Simple, inexpensive; CD includes Windows versions; good cropping and export features. | Can't create multirow movies; no choice of QuickTime compressor. | $49.95 |
| Widgetizer 1.0 | 3½ | Roundabout Logic (407/327-4500, www.roundaboutlogic.com) | Elegant interface; supports motorized turntables; unique sound support. | Can't import linear movies; no cropping features; limited export features. | $149.95* |

* *$249.95 bundle for both products.*

# Qube 2700WG Microserver

## WORKGROUP BOX SIMPLIFIES WEB, FILE SERVING

SETTING UP A WEB SERVER—either for a workgroup intranet or the Internet—usually is an expensive and tedious proposition. First you spend thousands of dollars on hardware and software, and then you spend hours on configuration and fine-tuning. Cobalt Networks changes all that with its Qube 2700WG Microserver.

The Qube delivers more than just Web serving; it also includes e-mail, DNS, file-sharing, document-archive, and threaded-discussion servers—all very helpful to groups of collaborating users. A well-designed Web interface lets you easily administer the server from any Web browser.



ARNOLD TIOSLO

The Qube's toaster-size deep-purple box sports a single Ethernet jack and a small LCD control panel on the back. A handy quick-start card guides you through initial setup, which consists of plugging the box into your network; powering up; and entering an IP address, subnet mask, and gateway address. A compact user's guide explains other setup chores and provides in-depth documentation. The small LCD screen takes the guesswork out of IP-address assignment and doubles as a display for monitoring start-up progress. A single bright-green indicator bar on the front blinks until the Qube is ready for operation.

The Qube's unassuming shell houses a 150MHz RISC microprocessor, either 16MB or 32MB of RAM, and either a 2.1GB or 6.4GB hard disk. The server runs Linux, a time-tested and popular form of Unix; a customized version of the shareware Apache Web server; and Cobalt's proprietary software for other services.

### An Administrator's Dream

You administer the Qube by pointing your Web browser at the Qube's IP address. A series of seven Web pages walks you through the initial setup process, during which you specify an administrative password, your Internet domain name, user names and passwords, and the services you want to deliver. Following initial setup, the Qube operates in a public-server mode, displaying an initial customizable Web page. Via this page, users can access various Web-based services, such as discussion groups or archives.

Workgroup users gain access to a wide range of services. Each user gets a personal home page on the Web server, maintainable either by means of a primitive, bundled page-building application or by their choice of third-party Web publishing tools. Each page lets its user define various personal preferences and back up data to a desktop computer.

Online discussion groups and document archives let users exchange public messages and upload documents for shared access. A comprehensive indexing tool allows users to easily locate messages and files on specific topics. You can assign users to password-protected groups to provide security for any of the Web-based services.

Some of the Qube's other services aren't Web-based. A general-purpose file server supports both AppleShare and Windows SMB, letting users from both platforms exchange files through their own native file-sharing systems. The file server also supports FTP, providing access across private TCP/IP networks and the Internet. Users can exchange e-mail with any POP3- or IMAP-compatible e-mail client, and they can configure their Qube home page for mail forwarding or an on-vacation automatic response.

The Qube offers sophisticated Web-based administrative tools to complement its user services. You can set user-specific space quotas to control disk usage, limit services by user, configure primary and secondary Domain Name Service, perform backups, and remotely upgrade the Qube's operating software. A comprehensive status utility continuously monitors the server's condition and provides useful warnings of problem conditions, such as an imminently full disk.

Numerous reports and graphs summarize CPU, disk, and Web-server usage and performance. Administrative features automatically index files, clean up the hard disk, and update statistical reports nightly. A Telnet interface lets sophisticated users delve into the Qube's Unix heart, although Cobalt disclaims responsibility for any resulting user-induced troubles.

### Not Perfect . . . Yet

The Qube delivers a lot, but a few improvements could make it even better, particularly for Mac users. The AppleTalk file server doesn't support TCP/IP access, preventing remote AppleTalk access via the Internet. Although the Qube's overall performance is satisfactory, administrative and user Web pages respond sluggishly at times. The document archive doesn't always provide the correct MIME type for Mac-originated documents (such as PDF or Microsoft Word files), and the indexing feature runs only at night, rendering the index out of date as users add files. The user's guide, although helpful for initial setup, supplies sparse information about other services. Online documentation consists of pop-up captions and annotations, leaving users to puzzle out some services for themselves.

### Macworld's Buying Advice

Despite some minor complaints, the Qube 2700WG Microserver is a remarkably useful product at a very attractive price. It provides the full range of services essential for workgroup serving, all controlled by an elegant Web-based interface. Even nontechnical users can set up the Qube, and Cobalt's clever software takes the pain out of administration. The Qube is a true winner.—MEL BECKMAN

**RATING:** ♦♦♦♦ **PROS:** Web-based administration; AppleShare file serving; document archive; IMAP e-mail support. **CONS:** No IP AppleTalk support; periodic sluggish Web performance; incomplete documentation. **COMPANY:** Cobalt Networks (650/930-2500, www.cobaltmicro.com). **LIST PRICE:** With 16MB of RAM and a 2.1GB hard disk, $1,249; with 32MB of RAM and a 6.4GB hard disk, $1,449.

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| Diamond Pro 1010e | 0.26 mm | 1800 x 1440/76 Hz NI | H: 30-115 kHz V: 50-152 Hz |
| Diamond Pro 1000 | 0.28 mm | 1800 x 1440/76 Hz NI | H: 30-115 kHz V: 50-152 Hz |

* DVI: Diagonal Viewable Image. Resolution refers to maximum addressable resolution H x V.

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# Read-It OCR Pro 6.0

VETERAN PACKAGE LACKS KEY FEATURES

OLDUVAI'S READ-IT OCR PRO 6.0.3 is like an antique car: although it performs the same basic functions as its modern counterpart, it's missing some important features buyers have come to expect. Read-It lacks many of the major components of other OCR packages: it can't cope with graphics, its capabilities aren't available from within other programs, and it can't produce a replica of an original scanned page. In its own spare way, Read-It processes paper documents into text files but provides little else in the way of amenities.

### Pro? No.

Don't let the *Pro* fool you: Read-It offers stripped-down OCR. There's no tool bar to guide you, but—to be fair—Read-It really doesn't need one. You simply launch the program, lay your document on the scanner, and choose Scan from the Commands menu. Then select Recognize from the same menu and save the results in one of several file formats, including text-only, Microsoft Word, RTF, ClarisWorks, WordPerfect, Nisus Writer, and HTML.

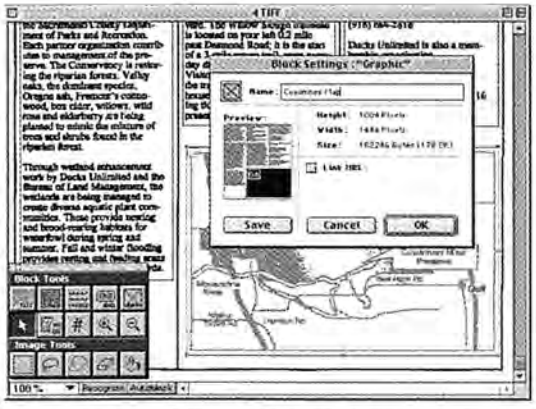
Read-It automatically configures the *zones*—blocks of text that should remain together, such as paragraphs or columns—for each recognition sequence. If it defines zones incorrectly or the page contains special items such as tables or graphics, you can manually define zones and assign them a processing order. Read-It's zone assignments are smart enough that user intervention is rarely necessary, except to partially disable recognition or save graphics as separate files.

Read-It comes on two floppy disks and installs a folder just over 5 megabytes in size. The program ships with a single scanner driver, for the Apple Color OneScanner; users of non-Apple scanners must run the laboriously slow Scanner Setup utility, which scans the start-up drive for scanner drivers.

During testing, Read-It returned "insufficient disk space" alerts in response to Scan commands. A quick trip to the manual showed why: unlike competing OCR packages, Read-It doesn't support gray-scale or color scanning. Changing the scanner's settings to monochrome solved the problem.

### Speed . . . but Little Else

Read-It's process is quick; I never felt impatient waiting for pages to be scanned and recognized. Much of that speediness is because Read-It scans in black-and-white. Performance also gets a boost since the program doesn't render an exact duplicate of the original page. That replica feature is an extremely appealing aspect of competing programs, such as Caere's OmniPage Pro (see *Reviews*, July 1998) and Xerox's TextBridge Professional (see *Reviews*, June 1996). A page with flowed text or multiple columns emerges from Read-It as a single-column document.




**Blocked Diagram** Read-It OCR Pro can't recognize graphics; instead, it blocks them out and saves them as separate TIFF files.

No OCR software is perfect—even 98 percent accuracy means many errors on a typical page of text—and Read-It is no exception. Not surprisingly, the cleanest documents—those with clear text and legible fonts—produced the fewest errors.

Read-It's ability to style text properly varied. Pages scanned to produce unformatted text emerged with occasional passages in italics or boldface and extra line breaks. Pages set to retain their formatting were more consistent but still displayed random formatting errors.

Read-It performed remarkably well on difficult text. The software easily recognized small text (with less success when the text was italic as well) and had few problems with uncommon words and proper nouns.

You can choose to correct OCR errors either from within Read-It or by exporting the file to your favorite word processor. Read-It comes with a spelling checker that shows a small window of the scanned image to help you compare. Unrecognized characters are theoretically marked with a bullet, but this inconsistent feature isn't much help in checking the page for accuracy.

Unlike other OCR packages, Read-It can't scan graphics—even black-and-white line art. Processed pages either lack images entirely or, if you define a graphic zone in the prerecognition stage, Read-It inserts a placeholder in the finished text. Read-It's clumsy workaround is to scan designated graphics as separate TIFF files for later inclusion in your documents (see "Blocked Diagram").

Read-It supports batch recognition but doesn't include any way to view or reorder the processed pages. The program cannot be launched from within another program, although recognized text can be saved into any open application. Read-It can't recreate the layout of scanned pages, but it provides templates for standard document types, strips carriage returns, and formats URLs. It also fully supports AppleScript.

### Macworld's Buying Advice

Despite some glaring oversights, Read-It is fast, scriptable, and tolerably accurate. Unfortunately, it's limited to monochrome scans, lacks real support for pages containing graphics, and can't re-create original layout formatting. The final nail in Read-It's coffin is the price. It's worth $60 to upgrade, but for first-time OCR users, OmniPage Pro and TextBridge offer dramatically more features for about the same price.—SUZANNE COURTEAU

**RATING:** ♦♦ **PROS:** Fast; accurate; easy to use; AppleScript-aware. **CONS:** Can't scan graphics, replicate original pages, or launch from other applications; monochrome-only; poor value for the price. **COMPANY:** Olduvai (305/670-1112, www.olduvai.com). **LIST PRICE:** $495.




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# Figure-Animation Tools

## POSER, LIFEFORMS SIMPLIFY CREATURE CREATION

SIGNIFICANT UPDATES TO MetaCreations Poser and Credo Interactive LifeForms—two long-standing choices for the three-dimensional modeling of living creatures—ease the process of simulating realistic motion for virtual figures. Although LifeForms 3.0 and Poser 3 have adopted many popular features of each other's previous versions, the programs remain unique in their approaches and results.



**No Cat Box to Clean** In addition to a reworked interface, Poser 3 includes some furry friends to accompany your human models.

### New Look, New Features

A redesigned look and feel clearly establishes Poser 3 as a MetaCreations product—its appearance and behavior make it reminiscent of Bryce 3D (see *Reviews*, April 1998), a product whose interface inspires love/hate reactions. In contrast to the distinctive-looking Poser, LifeForms offers a more standard tool set that most animators will find more productive. LifeForms' interface remains essentially unchanged from those of previous versions, offering a high degree of numerical accuracy.

In addition to having had a face lift, Poser 3 is generally better organized and more powerful than previous versions. Related controls are more logically grouped, and the new version sports a slick set of interactive parameter controls.

The upgrade also adds speedy, real-time, 3-D shaded-preview technology that's much faster than QuickDraw 3D's. Even low-end Power Macs offer enough speed to let you manipulate a fully textured Poser 3 figure model in real time. Shaded previews are new to LifeForms, which uses the slower and less visually accurate QuickDraw 3D engine for image previews.

LifeForms' editing methodology is superior to Poser's in some ways. For example, LifeForms superimposes wire-frame representations of your animated figure over the animation timeline—an intuitive way to highlight which part of the figure you're editing.

LifeForms lends itself to production-oriented tasks, while Poser proves better suited to less-structured experimentation, with a few key exceptions. Poser 3's motion-curve editor, for example, mimics similar features found in high-end animation tools and allows for precise control over all aspects of a virtual actor's movements. LifeForms delivers similar functionality by allowing direct access to numeric keyframe data but lacks Poser 3's advanced curve editor.

Other features bring Poser more in line with LifeForms. A slick Walk Designer dialog box lets you easily create realistic walking and running effects by specifying degrees of "shuffle," "sneak," and "strut," among other criteria. The Walk Designer's interactive wire-frame preview displays parameter changes more intuitively than LifeForms' Walk Generator, which lacks a real-time preview.

### People Power

When it comes to the task of creating detailed human figures, Poser 3 has the clear advantage: its new high-resolution human models are much more comprehensive than those delivered with LifeForms. Coupled with a better rendering engine, Poser's ability to define hairstyles and clothing makes the program's output much more usable as a final product.

Both programs support a wide range of output formats. For users who need to go beyond the basics, the LifeForms Studio version adds support for a greater variety of data-import and -export types—including file filters for Electric Image and Maxon Cinema 4D XL—and a wider variety of motion and model data. Most users will find the standard version adequate, though.

Both programs allow imported audio tracks, a useful feature notably lacking in previous versions of Poser. Both packages also now implement superior inverse kinematics, although LifeForms' comprehensive set of motion-constraint controls and superior tools for duplicating motion characteristics give that program the edge.

Previously available only in LifeForms, support for BioVision motion-capture data is now included in both programs. LifeForms also comes out ahead here, due to its comprehensive options for editing imported motion capture; Poser encountered some problems with imported data.

Poser 3 includes extremely detailed articulated-human-hand controls and the ability to create animated facial expressions, two features LifeForms lacks. Also unique to Poser is the addition of nonhuman models—a cat, dog, horse, and velociraptor are now standard fare—some of which have separately movable tails.

### Macworld's Buying Advice

If you're interested in quickly creating realistic virtual people with a minimum of effort, Poser 3 is your best choice. If you need more control over your figures' motion and better support for motion-capture data and you plan on primarily using a separate 3-D–rendering tool for final animation, LifeForms deserves close scrutiny as a viable—albeit more complex—alternative.—DAVID BIEDNY

### LifeForms 3.0

**RATING:** ♦♦♦♦ **PROS:** Precision control over motion; good support for external software. **CONS:** Slow QuickDraw 3D rendering; complex interface. **COMPANY:** Credo Interactive (604/291-6717, www.credo-interactive.com). **LIST PRICE:** $299; Studio version, $695.

### Poser 3

**RATING:** ♦♦♦♦ **PROS:** Detailed models; innovative Walk Designer; detailed facial and hand-animation capabilities. **CONS:** Nonstandard interface; glitches handling BioVision data. **COMPANY:** MetaCreations (805/566-6274, www.metacreations.com). **LIST PRICE:** $299.

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Mac OS

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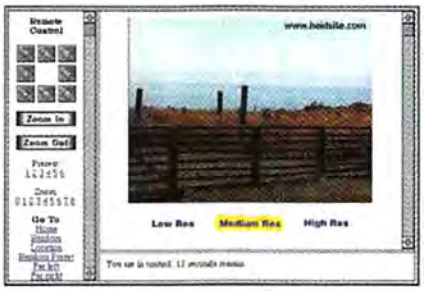
VIRTUAL VOYEURS OWE A DEBT of thanks to Rearden Technology, the creator of SiteCam—the premier software for creating Web cams, those live or near-live video views that appear on Web sites (see *Reviews*, December 1997). SiteCam 2.0 adds several enhancements, one of which makes it easier for users who don't have a continuous Internet connection. If a fixed view isn't interactive enough for your needs, Rearden's SiteZap bundle offers a remote-controlled Web cam that your site's visitors can operate themselves.

Like earlier versions, SiteCam 2.0 runs on any Mac equipped with video-input hardware or a Connectix QuickCam (see *Reviews*, September 1996). You can create images in a variety of sizes and formats and add captions and time stamps. You can also dish out images one at a time or use the included StarNine WebStar plug-in to serve up streaming video.

SiteCam 2.0 transfers images to a remote server, using file-transfer protocol (FTP), which enables you to add a Web cam to your site even if you don't have a continuous Internet connection. Other enhancements include the new Digitizer menu, which enables you to quickly switch between multiple video digitizers; improved antihijacking, which prevents unscrupulous Webmasters from putting your Web-cam images in their pages; and a few user-interface tweaks—too few, actually. Some advanced features, such as SiteCam's time-lapse–moviemaking function, are still a bit cumbersome. And SiteCam's lean, HTML-based documentation doesn't do much to clear the fog.

For a dramatically larger investment, the SiteZap bundle lets you add interactivity to your Web cam. On-screen controls enable visitors to zoom, pan, and jump to any of six preset locations (see "Cam with a View"). SiteZap relies on the intelligence of its bundled Sony EVI-D30 camera, a sleek black discus whose motorized base enables it to pan 180 degrees. The camera sports an autofocus lens with 12× optical zoom, and includes a remote control.

The camera's internal memory holds six preset pan/zoom/tilt settings, all accessible through the SiteZap software. The software includes SiteCam 2.0 as well as a utility that controls the camera and a WebStar-format plug-in that delivers SiteZap's video. (A dedicated Internet connection is required.)




**Cam with a View** When multiple users vie for access, SiteZap automatically gives each two minutes at the controls.

SiteZap offers streaming video, so visitors with a fast connection can see people and cars moving and even the blur of camera movement. According to testers, SiteZap delivered 2 to 4 frames per second via my ISDN line. The scriptable SiteZap software lets you control the camera through any AppleScript-savvy application.

### Macworld's Buying Advice

Rearden's SiteZap bundle is the *crème de la cam*, and it's priced accordingly. Given the quality of its camera and the versatility of its AppleScript support, the cost—close to $2,000—isn't outrageous. For the rest of us, there's SiteCam 2.0. Future versions could use better documentation and some interface refinements, but using this program remains the best way to give the rest of the world a peek at your part of the globe.—JIM HEID

### SiteCam 2.0

**RATING:** ♦♦♦♦ **PROS:** Powerful; doesn't require dedicated connection. **CONS:** Some interface flaws; lean documentation. **COMPANY:** Rearden Technology (415/550-7573, www.rearden.com). **LIST PRICE:** $129.

### SiteZap

**RATING:** ♦♦♦½ **PROS:** Excellent video quality; versatile AppleScript support. **CONS:** Pricey; lean documentation. **COMPANY:** Rearden Technology (415/550-7573, www.rearden.com). **LIST PRICE:** $1,995.






Introducing the **ScanMaker® 4,** the all-in-one scanner from Microtek, the most trusted name in desktop scanning. The same innovators who brought you the ScanMaker® III (winner of *Publish Impact Award, PC Magazine Editors' Choice and Best of 1997 awards*) now bring you this incredibly fast, dual-media color scanner.

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Full 36-bit color
input and output

## ScanMaker 4

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# TopDown Flowcharter 5.5

DIAGRAMMER DOUBLES AS TECHNICAL-ILLUSTRATION TOOL

PREVIOUS VERSIONS OF TopDown Flowcharter offered ready-made shapes to speed the creation of network diagrams, floor plans, and flowcharts. With the release of TopDown Flowcharter 5.5, Kaetron Software adds a more intuitive interface, a larger shape library, custom-symbol drawing functions, and many other enhancements that make TopDown a solid alternative to high-end illustration packages plus a fine flowcharter.

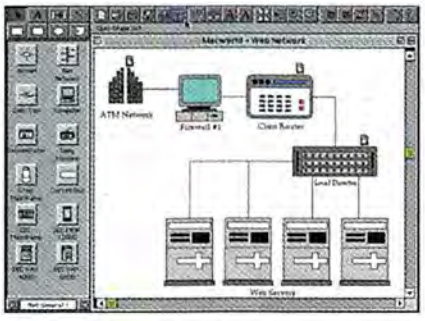
You don't have to be an artist to produce nice-looking illustrations with TopDown. You select shapes from the palette and click in the workspace; each time you click, the new symbol instantly connects to the last one. Where version 4.5 offered a few dozen shapes, this update contains several hundred symbols, conveniently organized into categories, including flowcharting, maps, buttons, logic, networks, space planning, and project scheduling.

Nested drawings, new in version 5.5, help you break complex tasks and diagrams into their component levels. You can, for example, develop a Web-site schematic in which the initial drawing displays the main sections of your server. Each shape then links to another document showing the content of that area.

The shape palette and revised tool bar help you work more efficiently, but the program contains a few minor efficiency glitches. Undo doesn't work with all operations, and some common tasks still require a visit to a menu. New users may become confused skipping between the main manual (written for version 4.5) and a brief addendum covering new features.

Unlike clip art, TopDown shapes carry preset behaviors, a feature that saves time when you're editing drawings. For instance, when you stretch a project-scheduling timeline, only the center enlarges; symbols on the ends correctly remain at their original size. Another great addition, especially for floor plans, is symbol dimensioning. As you draw, TopDown displays distances, and a visible grid (with variable spacing) helps you draw to scale.

Some drawing functions in particular bring TopDown 5.5 nearer to a full-fledged illustration package. The greatly improved symbol-editing window, for example, helps you modify existing objects or create new ones—you can easily alter a shape's color and border thickness, using clear dialog boxes.



**Tip-top Tech** TopDown's symbol collections let you create quality diagrams; top-level illustrations can link to others when more detail is needed.

Version 5.5's drawing functions, accessed from the top of the shape palette, let you combine ovals, rectangles, polygons, and lines to form unique objects. Like premade shapes, custom designs can have special properties—such as fixed height or width, text labels, and drop shadows—that you can easily control.

A particularly interesting HTML-conversion utility prepares files for the Web. It generates the required HTML code, GIF and JPEG files, plus any image maps needed to ensure that lower-level drawings are properly linked to the main Web page. Moreover, you can create links to other sites by simply entering the URL as the lower-level–drawing title.

### Macworld's Buying Advice

Finding a cozy niche between clip art and illustration programs, TopDown Flowcharter lets you quickly create and modify charts and drawings. In spite of some small irritations, TopDown provides a solid diagramming and illustration solution for novices and experts alike.—MIKE HECK

**RATING:** ▮▮▮▮ **PROS:** Extensive shape library; custom symbols with intelligent behavior; nested drawings; generates Web code and graphics. **CONS:** Drawing tools limited compared to illustration packages'; mediocre documentation. **COMPANY:** Kaetron Software (281/298-1500, www.kaetron.com). **LIST PRICE:** $199.



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# Vellum Solids

INTUITIVE 3-D CAD TOOL FOR PROS

FOR OVER A DECADE, ASHLAR Vellum has been a favorite program among architects and designers in the Mac community. Now Ashlar has added Vellum Solids, its latest solids-modeling engine, to its Mac OS repertoire. The program is easy to navigate, but its price and hardware requirements make it less than appealing for CAD rookies.

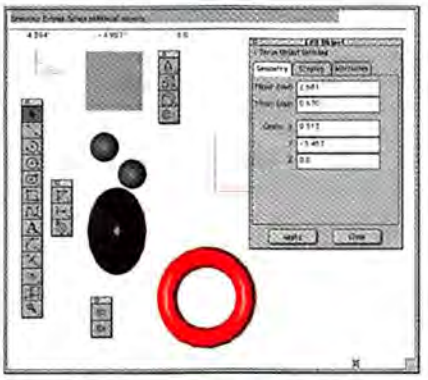
Most commercial solids-modeling projects start from an existing 2-D drawing, so I tested Vellum Solids' ability to import such files. Nearly every feature of a file in AutoCAD-based DXF/DWG format remained intact when imported to Vellum Solids. Vellum Solids can also read SACT files created by other ACIS-based modelers (Mechanical Desktop 2.0 being the prime example).

Like most major modeling software, Vellum Solids uses Spatial Technology's ACIS 3-D–modeling kernel. Ashlar makes ACIS-based modeling computation available in Vellum Solids through a series of menus, tools, and palettes that will be instantly recognizable to users of the 2-D version of Vellum or of Vellum 3D (which Ashlar intends to eventually replace with further Vellum Solids development).

Ashlar has conquered the ease-of-use challenge that dogs many CAD developers. Vellum Solids easily passes the use-first, read-manual-later test. I modeled a set of three injection molds for a complex biomedical instrument in a few hours, with just a few occasional forays to the manual and the Help folder.

Vellum Solids' enhanced Ashlar Drafting Assistant features include the ability to identify faces, edges, and holes in 3-D objects. New palettes feature intuitive 3-D tools for extrusion, stitching, holes, bosses, and lathes. And objects maintain parent/child associativity, so you can quickly produce large libraries of easily customizable objects.

Boolean operations on surfaces and solids are instant and simple to manage. With a few clicks and a drag, you can specify and modify basic 3-D shapes such as cones, cubes, spheres, and solid polygonal objects. Additional extras include radius filleting and multiple wall thicknesses for constructing shelling. And for final presentations, there's a complete selection of rendering and lighting options. Palettes for surface features are comparable to those in Vellum 3D, offering simple tools for arbitrary curves, mesh control, resolution control, and specification of surface "character."



**Precision Parameters** The tool palettes in Vellum Solids let you quickly generate 3-D objects and fine-tune designs by specifying parameters numerically.

Although Ashlar recommends a Power Mac G3 with at least 256MB of RAM for large-scale 3-D projects, my humble 233MHz system with 128MB of RAM was adequate at modeling complex objects, panning, zooming, and rendering. The program checks your system hardware and won't install if you can't offer it a whopping 96MB of RAM.

According to Ashlar customers, the $895 annual fee for Priority One support is a good value. However, even as a non-priority user, I received fast and complete e-mail support.

### Macworld's Buying Advice

Vellum Solids is an excellent, well-designed CAD program. If you can squeeze the price for both the product and the premium annual support into your budget, you'll be one happy designer. But if you don't create designs that require constant solids modeling, Vellum Solids is probably more tool than you need.—CHARLES SEITER

**RATING:** ♦♦♦♦ **PROS:** Strong import capabilities; easy to use; great online support. **CONS:** Expensive; professional-level product demands leading-edge hardware. **COMPANY:** Ashlar (408/487-9800, www.ashlar.com). **LIST PRICE:** $4,995.





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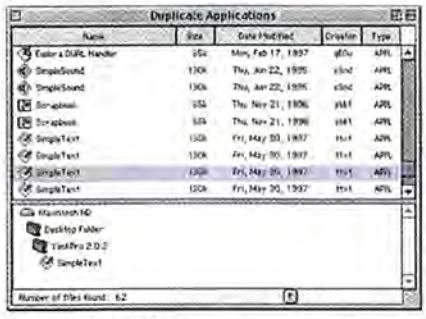
# YankPro 2.0

UNINSTALLER'S PRICE IS RIGHT

HARD DRIVES ARE GETTING bigger, but that doesn't make anybody happier about the encroaching tide of unnecessary help files, preferences files, orphaned aliases, and seemingly self-duplicating copies of SimpleText. No wonder, then, that utilities designed to curb this crud are the subject of intense interest. Aladdin Systems' Spring Cleaning has the right idea, but its $99 price tag, abysmal manual, and convoluted interface render it a crashing disappointment (see *Reviews*, February 1998).

YankPro 2.0.2 (based on the shareware program Yank) offers one-third the complexity of Spring Cleaning at less than one-third the price. You're offered a set of eight buttons, including Uninstall (which removes a program from your hard disk, along with all of its associated support files) and Slim Fat Applications (which deletes the code your Mac model doesn't need from "fat binary" programs). Other buttons hunt for empty files, empty folders, orphaned aliases, Apple Guide files, and duplicate applications.

When you click on one of these buttons, you're shown a list of candidate files.




**SimpleText Tribbles** Like those pesky *Star Trek* creatures, SimpleText seems to proliferate on every Mac hard disk. YankPro's Duplicate Applications feature locates and removes multiple copies.

After selecting the items you want handled, you choose a menu command, such as Move to Trash, Reattach Alias, or Slim Fat—and the deed is done. Everything takes place quickly within an interface that's clean, modern, attractive, and direct; you're not marched through a Spring Cleaning-like series of boxes ("Are you sure?" "Are you *sure* you're sure?").

Only one thing mars the YankPro experience: the program isn't very smart. Like Spring Cleaning (and, in fairness, most other computer programs), YankPro can only guess at which files need to be deleted. If you try to uninstall FileMaker 3 (because you now have FileMaker 4), for example, the program cheerfully offers to remove *both* versions *and* all of your FileMaker documents. If you ask to have orphaned preferences files deleted, YankPro also leads all of your QuicKeys or OneClick macros (which happen to be stored in your Preferences folder) to the guillotine. When you ask YankPro to find empty folders, it offers your Trash can for deletion.

Since YankPro operates so blindly, it's not a tool for novices. If you naively select all of YankPro's suggested items and delete them, you'll almost certainly cripple your system.

**Macworld's Buying Advice** YankPro can indeed reclaim megabytes upon megabytes of disk space in a fraction of the time you'd need in order to do the same job by hand, but it doesn't help you identify which files may be safely deleted. When it comes to spring cleaning of any sort, it seems, the hard work is left to you.—DAVID POGUE

**RATING:** ❚❚❚ **PROS:** Attractive, simple interface; low cost; high speed; reclaims dozens of megabytes in minutes. **CONS:** Requires expert supervision to avoid deletion of important files. **COMPANY:** Nisus Software (619/481-1477, www.nisus.com). **LIST PRICE:** $29.

# Mailsmith

E-MAIL PROGRAM DOESN'T DELIVER

HEAVY-E-MAIL USERS FEEL PASsionate about their e-mail programs. Bare Bones Software is no stranger to this phenomenon; its text editor, BBEdit, has legions of fans who have been eagerly waiting for Mailsmith, the company's first attempt at an e-mail client. Sadly, even though Mailsmith 1.01 has great potential, it also has many flaws.

Sharing BBEdit's renowned text engine, Mailsmith makes composing and editing messages a joy. You can issue most commands from the keyboard or automate actions via AppleScript or Userland Frontier.

Mailsmith neatly keeps its mail in a database, for flexible searching. You can search through all of your mail, based on any number of criteria, with a full array of logical operators (AND, OR, NOT, and so on). The program also features fuzzy searches—which locate text that approximately matches criteria. And like BBEdit, Mailsmith lets you use regular expressions to find and select your text, if you understand how to use grep, a geeky Unix-based (and difficult-to-master) method of searching.

Mailsmith also sports powerful mail filtering, a key tool for managing e-mail. Filters can be global or attached to individual mailboxes, and you can apply the same types of criteria to filtering as you can to searching.



**Down to the Bare Bones** Mailsmith's minimalist interface gets the job done but fails to use color or other elements to make the program easier to use.

Unfortunately, Mailsmith's searching and filtering flexibility doesn't make up for the program's universal lackluster performance. Mailsmith often lags when you switch mailboxes, launch the program, or address mail. If you plan to migrate to Mailsmith from another program, be prepared to wait; it took over six hours for Mailsmith to import 3,000 messages from my Claris Emailer account. The mail database isn't very efficient when it comes to storage, either; my 16MB Claris Emailer mail database expanded to 45MB in Mailsmith. I also needed to increase Mailsmith's RAM allocation, because the program crashed several times until I did so.

Mailsmith lacks some of the niceties of other programs. It doesn't show quoted text in a different color, and it doesn't use the StuffIt Engine to automatically compress file enclosures. Once you queue a message for sending, you can't change your choice of signature or file enclosure. Mailsmith doesn't yet support IMAP or LDAP, two mail protocols important to larger organizations, nor does it support HTML-formatted e-mail. Bare Bones may consider Mailsmith's interface a functional exemplar of the company name, but the program feels sterile and uninviting.

**Macworld's Buying Advice** Given my appreciation for BBEdit, I had high hopes for Mailsmith—hopes that foundered on the program's sluggish performance and bugs. Mailsmith shows real promise, but until Bare Bones solves the performance problems, it will remain only marginally acceptable. —TOM NEGRINO

**RATING:** ❚❚ **PROS:** Excellent text handling, searching, and mail filtering. **CONS:** Slow; utilitarian interface; lack of common features; buggy. **COMPANY:** Bare Bones Software (781/687-0700, www.barebones.com). **LIST PRICE:** $79.

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# Kai's SuperGoo

CARICATURE'S NEVER BEEN EASIER

AS AN UNDERSIZE YOUTH, I WAS no match for playground pugilists. I sought retribution by accessorizing my tormentors' class pictures with devil's horns, scraggly mustaches, and—the old reliable—an arrow through the head. Had Macs existed during those innocent years, I might have forgone the pen and instead relied on MetaCreations' SuperGoo to exact my revenge.

I can see it now. Surely Mitch Jacobs's cruel features will benefit from a turn through the Goo Room—the area of SuperGoo where you pinch, twirl, smear, smudge, and nudge areas of an image with a collection of brushes. Adding an effect such as Zig Zag, Ripple, Twirl, or Stretch with SuperGoo's Effects buttons couldn't hurt either. And should Mitch happen by, a quick adjustment of the Global Undo slider—a control that allows you to remove a little or a lot of your alterations—will save my bacon.

And what if I lack a picture of the new kid who chipped my tooth on the monkey bars? I *could* use SuperGoo's TWAIN Acquire capabilities to pull a picture directly from my scanner or digital camera, but that's too easy. Instead I can switch to SuperGoo's Fusion Room to create her face from scratch by selecting from a library of such features as eyes, noses, mouths, and hair and accessories such as glasses and hats. These libraries—although too limited for police work—supply male as well as female features.



**Feelin' Goovy** Kai's SuperGoo lets you pinch, smear, and smudge friends and foes alike.

Once I closely approximate my tormentor's tough little mug, I can use the Edit palette to adjust selected portions of her face; move my picture to the Goo Room for some tweaking; and add a text banner reading, "Kim Woods is a big stinker." Finally, I can ponder whether to export the picture as a PICT, TIFF, GIF, or JPEG file or Photoshop document, so I can add the requisite arrow through the head in my preferred image editor.

Why not use Kai's Power Goo, SuperGoo's earlier incarnation, to perform these same feats? Although Power Goo was a worthy tool (see *Reviews*, January 1997), it didn't run unless its CD-ROM was left in the drive and it didn't allow you to pan or zoom in and out of a picture as you can with SuperGoo. Also, the old Goo accommodated only square pictures, whereas SuperGoo works happily with pictures at any aspect ratio.

Some things haven't changed, however. You can still create animations—called Goovies—by dragging pictures to frames of a filmstrip window. Unfortunately, there's no way to delete frames and replacing frames is unreliable.

**Macworld's Buying Advice** As much as my inner child wishes that this tool had been available years ago, I still get pleasure from it today. Child or adult, if you're searching for a "Goovy" caricature utility, SuperGoo is for you.—CHRISTOPHER BREEN

**RATING:** ♦♦♦♦ **PROS:** Inexpensive; highly entertaining. **CONS:** Limited library of body parts; Goovy interface needs work. **COMPANY:** MetaCreations (805/566-6200, www.metacreations.com). **LIST PRICE:** $49.95.

# MacComCenter Plus 3.0

KITCHEN-SINK TOOL LACKS POLISH

EVER SINCE THE INTERNET exploded into popularity, using a modem for anything other than PPP dial-up has become increasingly rare. Consequently, traditional communications packages haven't made many exciting advances lately. In an attempt to fend off user apathy, Smith Micro offers MacComCenter Plus 3.0, a comprehensive package for squeezing every conceivable telecom capability out of your modem.

MacComCenter Plus provides modules that handle faxes, voice mail, terminal emulation, file transfer, and paging. Message Center—the hub of the package—contains an address-book editor and scheduler and lets you define locales (such as home or office) and associate different settings with each one. Some global preferences, such as whether a modem should answer incoming calls, are also set here. Oddly enough, one setting that *should* be global—defining whether header information is included on each outgoing page—must be configured in the Page Setup dialog box.

When tested with a 3Com/U.S. Robotics Courier V.Everything modem, MacComCenter Plus had no problems recognizing the modem and its features. MacComCenter faxes from within any application that allows printing, and the process is speedy.



**Pixels into Words** Once you've opened a received fax, you can launch the bundled OCR software with a single menu selection.

Sending a fax is a simple matter of using the MacComCenter fax printer driver and specifying the transmission time. A small Imaging Monitor spooler launches in the background immediately after a fax is created by the printer driver. Once the spooler generates the transmittable file, the fax is sent in the background.

In addition to its fax features, MacComCenter offers voice mail to those with voice-capable modems. The Voice Script Editor lets you create a voice-mail maze to compete with the best of them and can also save incoming messages in separate voice-mail boxes, fax documents on demand, and send a message to a pager. MacComCenter also includes Xerox's TextBridge OCR software for transforming received faxes into text documents.

Alas, MacComCenter Plus 3.0 proves surprisingly immature for a third-generation product. The package's breadth of features is marred by the product's scattershot approach of distributing files into multiple folders all over your hard disk, and the user interface lacks integration and polish.

**Macworld's Buying Advice** Despite its flaws, MacComCenter Plus 3.0 offers something for nearly every modem owner. If your modem didn't come with fax software, this capability alone can be enough to warrant a careful look. And for small businesses, the ability to add voice-mail and fax-on-demand services inexpensively can be a great boon.—STEPHAN SOMOGYI

**RATING:** ♦♦♦ **PROS:** Comprehensive feature set; support for many modems. **CONS:** Loosely integrated; too many files; unnecessarily cumbersome user interface. **COMPANY:** Smith Micro Software (949/362-2350, www.smithmicro.com). **LIST PRICE:** $99.95.




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# PhotoAnimator

SEQUENCER FOR PHOTOSHOP FILES

EXTENSIS PHOTOANIMATOR OFfers some basic animation effects for the business market but falls short of being a full-featured tool for artists. Designed for Adobe Photoshop users, PhotoAnimator 1.0 provides only a portion of the functionality required to create advanced animation effects.

Billed as an "animation sequencer," PhotoAnimator lacks tools for creating basic graphic elements, such as text and gradients. It assumes that you'll be creating your graphics in an external editor, preferably Photoshop.

In its favor, PhotoAnimator offers direct support for layered Photoshop documents. Although layers can be imported —complete with alpha-channel, transparency, and layer-mask information— PhotoAnimator supports only the Normal layer-blending mode; all other native Photoshop modes, such as Multiply and Screen, are ignored. Surprisingly, PhotoAnimator cannot directly import PICT or JPEG files; in addition, you cannot paste the contents of an external Clipboard into a PhotoAnimator document. It supports cutting and pasting only internally, a serious design flaw.



**Try Before You Save** PhotoAnimator lets you choose a specific download speed and preview color palettes and dithering schemes.

PhotoAnimator organizes imported graphic elements into layers of frames, and a timeline window displays the contents of the layers arranged over time. The package's limited animation capabilities consist of effects that can be attached to animation or mask cells. Wipes, fades, scaling, and rotation effects represent a workable set of basic animation tools but lack any real pizzazz. Although you can combine multiple effects, the individual effects are noticeably weak in the areas of motion control and keyframing.

PhotoAnimator does sport some slick features designed to make Web designing a bit easier. The Export dialog box lets you experiment with various color palettes and bit depths, and allows you to specify a connection speed (from 9,600 bps to T1) and see a numerical estimate for download time and file size.

Some odd omissions are sure to frustrate experienced Web artists. You can't specify timings for specific cells or ranges, so you have to duplicate cells to increase the duration of an element on screen (although PhotoAnimator creates the appropriate pauses at export time instead of using multiple instances of the static element to lengthen duration).

**Macworld's Buying Advice** PhotoAnimator's low price makes the program an easy choice for animating layered Photoshop documents, but it's not likely to grab the attention of serious Web animators, who are likely to hold out for the pricier but much more capable Adobe ImageReady (see "Web Design's New Dynamic Duo," *Macworld*, July 1998).—DAVID BIEDNY

**RATING:** ♦♦½ **PROS:** Supports layered Photoshop documents; good preview controls. **CONS:** Lacks advanced special effects; no support for animating Photoshop-compatible filters; cannot open PICT files. **COMPANY:** Extensis (503/274-2020, www.extensis.com). **LIST PRICE:** $99.

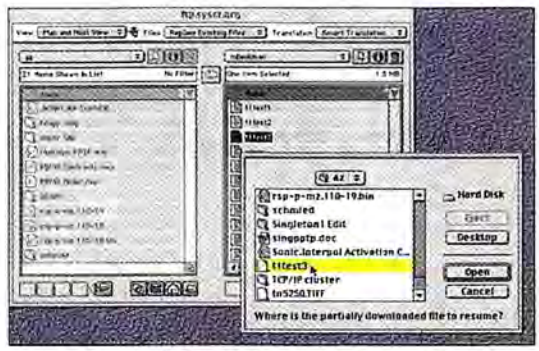
# FTP Client Pro 2.8

UTILITY EASES FILE-TRANSFER PAIN

THE CURRENT BOOM IN WEB publishing has made Internet file transfer with File Transfer Protocol (FTP) a common task. Alas, FTP's Unix heritage makes it tedious to manually upload HTML and graphic files using shareware or browser-based FTP. Vicom's FTP Client Pro 2.8.1 simplifies the process through a Mac-friendly drag-and-drop interface, automatic file translation and error recovery, and AppleScript support.

The heart of FTP Client Pro is its elegant user interface, which has a Mac OS 8 look and feel. Once connected to a remote FTP server, you view a Finder-like list of files available for download. Dragging items from this window to any folder on your Mac initiates a file transfer, as does dragging icons from your desktop to FTP Client Pro's window. You can customize the file list itself, showing the attributes—such as size and access permissions—you find convenient. A side-by-side view lets you browse remote and local directories simultaneously—a handy feature when synchronizing files on a server.

Even if this were all FTP Client Pro did, it would be worth buying—no shareware or browser-resident FTP client offers these features. But FTP Client Pro adds a wealth of other useful tools. An icon-mapping facility lets you create a Finder alias for a particular directory of a remote server. Dragging a file to this icon automatically opens a connection to the server and uploads the file. Suffix mapping and host-server recognition let you automate file-transfer conversions, and a resume-transfer feature picks up failed transfers where they left off. Browser integration lets you use FTP Client Pro as the file-transfer agent for your Web browser, and AppleScript support makes complete hands-free automation of any file-transfer task straightforward.




**Transfer Point** FTP Client Pro 2.8.1 sports a Mac-friendly drag-and-drop interface and advanced file-transfer capabilities, such as the ability to resume a partial transfer.

The only feature lacking is automatic folder synchronization. Vicom says it will provide an AppleScript for this function in a future release.

**Macworld's Buying Advice** FTP is the de facto file-transfer standard for the Internet, but its Unix heritage makes using it laborious and prone to errors. Vicom's FTP Client Pro 2.8.1 brings a fresh Macintosh face to this venerable utility. Although Vicom offers limited-function freeware and "lite" editions of FTP Client, the Pro version adds extensive automatic-file-translation and host-compatibility features that will help anyone doing at least one or two file transfers per week. For $50, you can't afford to be without this tool.—MEL BECKMAN

**RATING:** ♦♦♦½ **PROS:** Drag-and-drop interface; suffix mapping; automatic translation; ability to resume interrupted transfers; scriptable. **CONS:** No automatic-file-synchronization feature. **COMPANY:** Vicom Technology (650/691-9520, www.vicomtech.com). **LIST PRICE:** $50.




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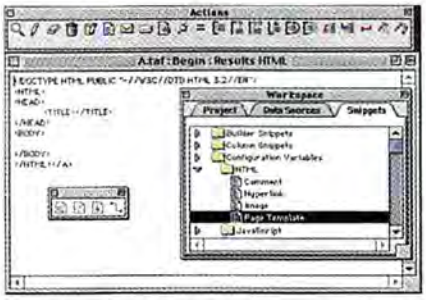
# Tango Enterprise 3.1

MODERN CLIENT/SERVER DATABASE TOOL

A FEW YEARS AGO, TANGO PREmiered as an optimized client/server database application. Today, Tango Enterprise 3.1 updates the client/server concept to current reality, in which any information transmitted on a network is likely to travel on the Internet for at least part of its journey. Unlike Tango 3.1 for FileMaker—a tool kit specifically for FileMaker-based Web sites (see *Reviews*, August 1998)—Tango Enterprise connects any database to any user, via intranet or Internet, and creates dynamic Web sites as a bonus.

The new version introduces the Tango application file, a generic text-file container created from a variety of sources: HTML documents complete with JavaScript enhancements, commands based on Tango's luxurious assortment of metatags, and calls to Java class files. You assemble this .taf file (distinct from Tango's previous .qry format) in the Editor module, which also implements icon-based branching and logical instructions.

Tango provides code for anything you might want to accomplish—from simple queries of remote databases up to multiway transaction processing—so it's particularly effective as a rapid-development tool.




**Actions!** Tango's Actions bar offers a visual tool kit for connecting code snippets and other prefab pieces into a working Web database application.

The .taf file is read and interpreted for your Web server by the separate (but required) Tango Application Server (in the form of either a WebStar plug-in or an AppleEvents file). The Application Server executes transactions—such as lookups, transfers, or computations—and returns finished HTML to the Web server and then on to the client browser. The user sees only HTML pages and none of the two-layer complexity of Tango, but behind the scenes, user responses can modify actual site content rather than merely select static pages for viewing.

The downside of this arrangement is twofold: Everyware's price for the Server/Editor package puts it in the pros-only range, and the extra application-server layer slows things down, compared to performing the same tasks with pure CGI code. Fortunately, the speed penalty isn't apparent with modem- or ISDN-connected browsers, and the price is reasonable for a tool of this scope.

Tango code works without modification in Windows and Unix environments. Both phone and online support are excellent, and the browser-based help system is gratifyingly complete.

**Macworld's Buying Advice** Tango Enterprise lives up to its name, letting programmers deploy Mac-created solutions in environments ranging from basic Web commerce to integrated multisite applications. It's not for novices, but developers with database experience will find that using it is the fastest way to get serious applications running on the Web.—CHARLES SEITER

**RATING:** ♦♦♦♦ **PROS:** Rapid-development tool kit for complex Web business applications. **CONS:** Requires serious database background; some speed issues; pro-level price. **COMPANY:** Everyware (905-819-1173, www.everyware.com). **LIST PRICE:** $685, plus $2,500 for Tango Application Server.


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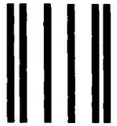
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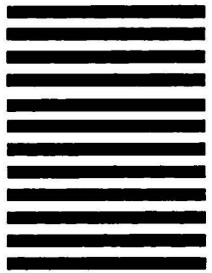
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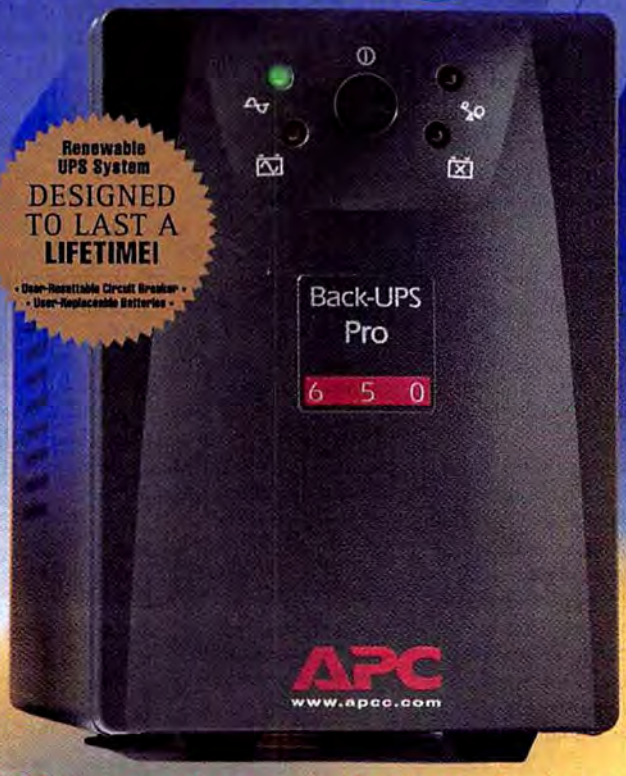
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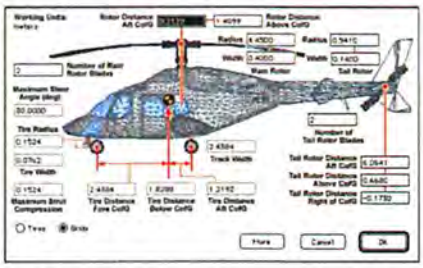
# ReelMotion

UNIQUE 3-D PHYSICS ANIMATOR

THE MOST ARDUOUS ANIMATIONS involve emulating the things nature takes for granted—such as gravity, wind, or friction—and simulating physics-oriented interactions. Filling a long-standing gap, ReelMotion 1.0, from Motional Realms, delivers a virtual-physics engine that communicates with many popular 3-D programs. Though designed as a general-purpose motion simulator, ReelMotion has sample files that clearly skew it toward vehicular animation. It's not intended for casual users, but advanced animators will find ReelMotion both fascinating and useful.

To begin a motion simulation, you create a set of 3-D objects in your preferred modeling program and import DXF files into ReelMotion. Because ReelMotion requires relatively low polygon counts, you must simplify complex objects to create corresponding ReelMotion motion data, which can then be reapplied to complex geometries in the originating package.

Once in the ReelMotion environment, you create the necessary *effectors*—invisible controls that specify how mechanical components interact with the environment. For example, a compression variable determines how a car handles over bumpy terrain.



**Not-So-Virtual** You need to know a fair bit about helicopters to make your animation fly realistically.

Once you've set up your effectors, real-time controllers let you "drive" your vehicle; imported DXF files can provide irregular terrain. ReelMotion offers full dynamic response, including screen updates with QuickDraw 3D shading.

To view your work, you choose from a variety of camera angles, including a view from the driver's seat and an external shot from a chase vehicle. You can also set up collision detection for specific objects—allowing for simulations of crashes—and detailed interactions with surface objects, such as racecourse obstacles. ReelMotion also supplies keystroke commands for applying a burst of energy—from something like an under-car detonation or a bouncing mine.

But ReelMotion's usefulness isn't just limited to Detroit think tanks. With some basic physics knowledge, you can modify the program to simulate more-mundane systems, such as bouncing objects or rotating gears. ReelMotion data can be exported in the BioVision Hierarchy (BVH) format—supported by 3-D programs such as MetaCreations' Poser 3 and Credo Interactive LifeForms (see review in this issue)—as well as the Acclaim Skeleton File (ASF) and Acclaim Motion Capture (AMC) formats. ReelMotion also includes plug-ins for Cinema 4D XL (see *Reviews*, June 1998) and Electric Image, allowing these programs to access ReelMotion animation data directly.

**Macworld's Buying Advice** Although its lofty price puts the program out of the realm of most novices and impulse buyers, ReelMotion can be a serious production tool if you possess the physics knowledge required to make the most of its unique animation capabilities.—DAVID BIEDNY

**RATING:** ♦♦♦♦ **PROS:** Powerful simulation engine; real-time object manipulation. **CONS:** Requires knowledge of physics; hardware copy protection. **COMPANY:** Motional Realms (703/860-0714; www.reelmotion.com). **LIST PRICE:** $795.


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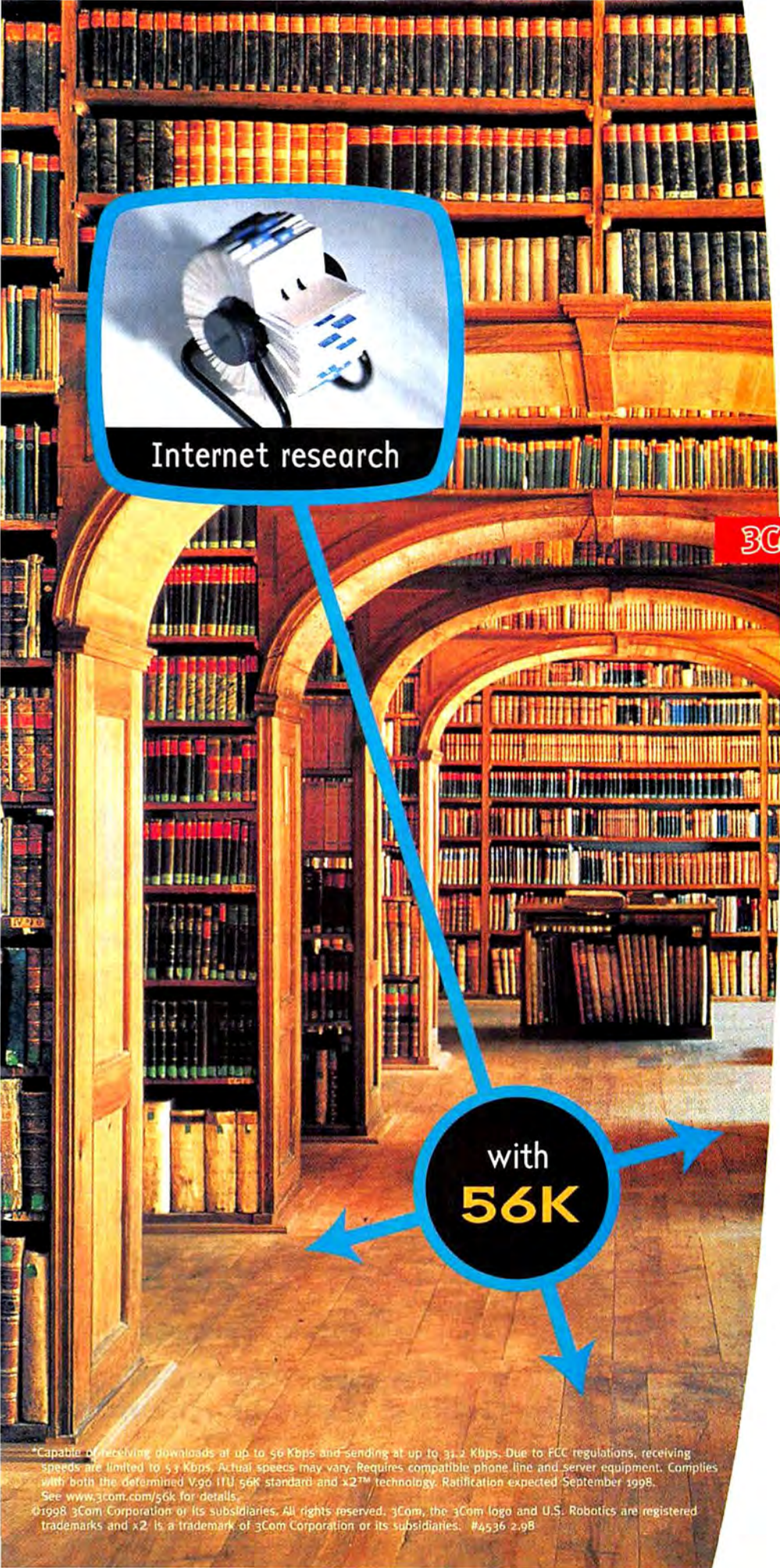
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# Kiplinger's Home Legal Advisor

PROGRAM OFFERS BARE-BONES LAW ADVICE BUT FEW TECHNOLOGICAL ADVANCES

KIPLINGER'S HOME LEGAL ADVISOR sets a rather modest goal for itself: providing commonly used legal documents designed to be valid in most states. The program succeeds within these limits but offers very little technological assistance other than suggesting the appropriate forms and providing blank spaces for your information.

Home Legal Advisor helps you create 71 different legal documents, continually advising you to seek advice from a local attorney to ensure that your work is valid. Using a simple interview format, its Document Guide generates a list of files that pertain to your particular situation. The program provides brief video introductions as well as detailed textual explanations to assist you in completing each form. The package also includes a Personal Law Library, complete with Kiplinger's Handbook of Personal Law, Gilbert's Law Dictionary, and a Home Legal Guide.

Home Legal Advisor presents its forms—which include Wills and Living Trusts, Living Wills, Health Care Powers of Attorney, Prenuptial Agreements, Offers to Buy Real Estate, and General Powers of Attorney—in a fill-in-the-blank format. Red text indicates a "decision point," where you're required to supply information; green denotes a word or a phrase with a pop-up explanation; and blue signifies a completed decision point.




**Lawyer on Demand** Home Legal Advisor's video discussions offer brief introductions to help you pick the right document for your needs.

Unfortunately, the program doesn't go out of its way to use your computer's capabilities to simplify your work. You can enter names you'll use repeatedly into the Party List and select them from a pop-up list, but this list isn't available for every decision point, so you still end up retyping frequently used names. Additionally, Home Legal Advisor doesn't link its various forms, which proves to be a major inconvenience when legal documents require supplementary forms or when your requests must remain consistent from one file to the next.

None of Home Legal Advisor's three legal reference guides can be searched by keyword. And although the product's packaging mentions a software bundle, it's not included with the Mac version.

**Macworld's Buying Advice** Nolo Press's WillMaker 6.0 (see *Reviews*, August 1996) provides far more information on estate planning, and any good $30 "how to buy a house" book offers much better process information and more-detailed boilerplate forms dealing with real estate. It's hard to beat Home Legal Advisor's price, but due to a lack of technological savvy, the program's usefulness is limited to the basics.—LIZA WEIMAN HANKS

**RATING:** ★★½ **PROS:** Succinct legal advice; simple forms. **CONS:** Documents not well integrated; no keyword search; software bundle not available with Mac version. **COMPANY:** Block Financial (617/428-1119, www.blocksoft.com). **COMPANY'S ESTIMATED PRICE:** $29.95.

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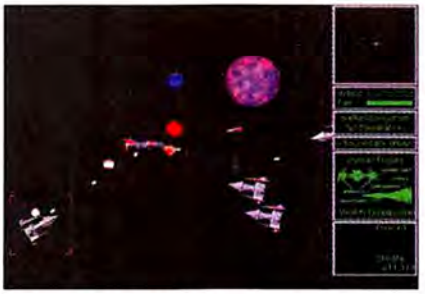
# Escape Velocity: Override

SPACE-BASED ADVENTURES FOR YOUR INNER MERCENARY

FOR GAMERS WHO FEEL A particular affinity for *Star Wars*' curmudgeonly smuggler, Han Solo, Ambrosia Software's Escape Velocity: Override offers a slam-bang, action/adventure space opera where the only difference between the heroes and the villains is which side you choose to align yourself with. It's also more fun than one mercenary should be allowed to have.

Starting as a fresh Space Academy graduate with a shuttlecraft and a pilot's license, you hustle for short-run transport jobs between star systems. Most of Override's action takes place in real time, as you pilot your starship from system to system. The game relies on simple keyboard controls (you can attach a joystick if you prefer), and you pilot your vessel with a top-down view reminiscent of the old arcade favorite Asteroids. Override's effective minimalist graphics work well even on older machines. Alas, once you've explored more than a third of the available galaxy, Override's star-map navigation interface becomes unwieldy.

If you deliver your cargoes on time and avoid being burned to cinders by marauders, you'll earn credits with which you can upgrade your ship. You can also buy larger ships with longer ranges and room for more cargo. Don't forget to spend some of your credits on weapons: it's a tough galaxy, and some renegades won't take no for an answer.



**Yo Ho, Yo Ho** Everybody wants a piece of you. But then, you're a space pirate—get used to it.

There's plenty of fun to be had running cargo and scrapping, but Override really shines in its long-term play. Where most games lead you by the nose, Override drops you in the middle of a brawling, sprawling galaxy and challenges you to make your own way. As your fame, fortune, and combat readiness increase, individuals, corporations, and governments seek your assistance with anything from transporting classified military cargo to smuggling to fighting wars. Ambrosia's designers have populated nearly every corner of their universe with stories that evolve and change as you complete multiple missions. The only limits are in how much you and your ship can handle.

Override offers only single-player action—so you can't team up with your friends—but there's so much going on that it's hard to imagine becoming bored. If you manage to exhaust the game's possibilities, you can look forward to exploring other galaxies, as Ambrosia is offering its scenario-construction tools to the public.

**Macworld's Buying Advice** Although Escape Velocity: Override is technically shareware, you won't find many games of its quality for even three or four times the price. The game's blend of high-speed action and mission-driven story lines makes for an addictive combination.—CAMERON CROTTY

**RATING:** ♦♦♦♦½ **PROS:** Excellent high-speed action; unique mission-driven story lines. **CONS:** No network or multiplayer option. **COMPANY:** Ambrosia Software (714/325-1910, www.ambrosia.com). **DIRECT PRICE:** $25.


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# iMac Reality Check

MACWORLD ANSWERS YOUR MOST FREQUENTLY ASKED

by Henry Bortman

STEVE JOBS TOOK THE WORLD BY SURPRISE in May with the introduction of the iMac, Apple's stylish $1,299 consumer Mac. Both inside and out, the iMac is like no other Mac ever created—and so in the hubbub that has followed Jobs's surprise announcement, it's been tough to separate iMac fact from iMac fiction. Since our first story on the subject ("The iMac Cometh," July 1998), we've been inundated with mail asking for more specifics on Jobs's translucent blue pride and joy. Ask and you shall receive.

### The iMac doesn't have a floppy drive.

**TRUE** It was probably the biggest topic of discussion after the iMac was announced: it's got a 24× CD-ROM drive but no floppy drive (or any other form of storage that involves removable, writable media). If floppies are still an important part of your life, don't worry. Newer Technology and Imation will each offer drives that can read from and write to floppies (see the accompanying feature, "The USB Connection"). Which means that the iMac *can* read floppies—but only if you shell out an extra $70 to $190 for an external drive.

Let's follow Apple's logic here. There are three main reasons people use floppies: to install software, to back up, and to transfer small files back and forth. Most software these days ships on CD-ROMs or is available online. At 1MB a pop, floppies are too small to be useful for backing up the iMac's 4GB

# QUESTIONS ABOUT APPLE'S NEW CONSUMER MAC




PHOTOGRAPHS BY MARK JOHANN

hard drive. A removable-cartridge drive, such as an Iomega (www.iomega.com) Zip drive, an Imation (www.imation.com) SuperDisk drive, or a SyQuest (www.syquest.com) SparQ drive, makes more sense. Finally, in large organizations, using the iMac's built-in Ethernet to back up to a remote server is also a potential solution.

That leaves the biggest problem: casual file transfer. Floppies are still useful for carrying a file or two, but Apple is banking on the assumption that most people won't need to buy that external floppy drive—they'll just use the Internet to transfer files from place to place.

### The iMac's processor isn't upgradable.

**UNCLEAR** This processor daughtercard is theoretically replaceable, but that's easier said than done. In addition to a 225MHz CPU, the daughtercard contains an Open Firmware boot-ROM chip the iMac needs in order to start up. The creator of any iMac upgrade card would have to include an Open Firmware boot ROM on that card—without any help from Apple. That one hurdle may be enough to prevent the emergence of iMac processor upgrade cards.

But after seeing a lowly Power Mac 6100 running at blinding speeds with a freshly installed G3 processor upgrade, we've learned never to say never when it comes to upgrade cards.

### The iMac's ROM will use up part of the iMac's memory.

**TRUE** Unlike with previous Mac models, the iMac's ROM—containing the Mac's fundamental operating instructions, such as how to draw a button or display text—is stored as software on the iMac's hard disk rather than burned into Apple proprietary ROM chips. These instructions must be loaded into memory (RAM) before an iMac can function, and they'll take up space that your running applications might have used.

But don't despair: the whole ROM doesn't load at once; portions of it load dynamically only as they're needed. Apple says the worst case it's seen is the ROM using up 3MB of memory. That means that even in the worst-case scenario, your iMac will still have 29MB of RAM free for the rest of the system to use.

### The iMac supports only 128MB of RAM.

**TRUE** Although the processor daughtercard is similar to that of the PowerBook G3, which can support up to 192MB of RAM, the location of the card inside the iMac leaves too little space for the highest-density RAM DIMMs to fit. If those big DIMMs shrink in size, it may be possible to add more RAM to the iMac in the future.

### The iMac isn't designed for playing games.

**FALSE** Apple says the iMac is designed to be a good gaming machine, and the iMac does come with an ATI Rage II 3-D accelerator built in. The Rage II works with games like MacSoft's Quake; Bungie Software's Weekend Warrior; Activision's MechWarrior 2; and Pangea Software's Nanosaur, which is bundled with the iMac.

However, hard-core gamers who worship at the temple of the 3Dfx accelerator chip—a powerful graphics boost to games such as Bungie's Myth and MacSoft's Unreal—won't be pleased with the iMac's goods. There's no 3Dfx chip built into the iMac and no PCI slot in which to add a 3Dfx card. For die-hard 3Dfx aficionados, the iMac appears to be a failing proposition.

### You can't connect a digital camera to an iMac.

**UNCLEAR** If you're worrying about your digital camera that connects to your Mac via one of the serial ports, hang on. Camera vendors and Universal Serial Bus (USB)–to–serial-adapter vendors are huddled in secret laboratories even as you read this, trying to solve this very problem.

If you've got a camcorder and want to do some digital-video editing, you're in direr straits. Most video cameras connect to the outside world with either S-Video or RCA-style composite-video connectors. As far as we know, there aren't any adapters in the works that would enable




**Round Mouse in Square Hole** The iMac's mouse and keyboard are unlike anything ever seen before on the Macintosh. Sure, both feature see-through plastics, and the mouse's rounded shape brings to mind a wheel of cheese, not a cheese-loving rodent. But what's most important is what's on the inside—both connect to the iMac via the Universal Serial Bus (USB), a replacement for the Mac's tried-and-true Apple Desktop Bus (ADB).

these connections to work with USB. Moreover, full-resolution digital video requires too much data to transfer over USB. There *are* some low-resolution USB video cameras in the works, which may do the trick if their quality is sufficient for your needs.

### The iMac comes with only a 33.6-Kbps modem.

**FALSE** When Steve Jobs originally announced the iMac, he said that it would ship with a built-in 33.6-Kbps modem. But in July, Apple announced that the iMac will move with the times and ship with a 56-Kbps modem supporting the V.90 protocol.

### You can't use your ink-jet printer with an iMac without buying an adapter.

**TRUE** The serial ports we've become so accustomed to seeing on the back of our Macs simply don't exist on the iMac. In their place are two USB ports (see "Window to a New World").

If you've got a new ink-jet printer, you may be in luck: Alps, Epson, and Hewlett-Packard have all announced adapter-cable–and-software packages that support a limited set of modern models. But if you already own a printer that isn't on the list—and at press time, even Apple's own Color StyleWriters weren't!—you're out of luck for now. Several vendors are working on adapter-and-software bundles that will support a wider range of ink-jet printers, but it's too early to determine which models will be supported.

If your printer has an Ethernet port (as do most recently sold laser printers), you're home free, since the iMac has built-in Ethernet. If you need to connect to a LocalTalk-only printer (such as an older laser printer), you'll need to buy an EtherTalk-to-LocalTalk bridge. These are available from several vendors, including Asanté (www.asante.com), Dayna Communications (www.dayna.com), and Netopia (www.netopia.com), for between $100 and $300. Apple also provides a software equivalent, LaserWriter Bridge, which is available free for download from the company's Web site. But a printer attached with LaserWriter Bridge must be connected to a Mac that *does* have a printer port, is on your Ethernet network, and is turned on—otherwise, that printer won't be available.



**Window to a New World** Inside the iMac's side port door are a suite of connectors that prove just how this Mac is not like any other. In addition to audio-in and -out ports (far left) and a phone jack (far right), there's an Ethernet port (second from right). The new faces in this scene are the pair of USB ports (middle), the only means of connecting external peripherals to the iMac. What's most conspicuous is what's *not* here—no ADB, no Modem and Printer ports, and no SCSI port.

### The iMac is speedy. (or) The iMac is slow.

**UNCLEAR** It's got a 233MHz processor with a 512K backside cache—a combination that should yield respectable performance. However, at press time Macworld Lab had not tested an iMac to confirm these suspicions. By the time you read this, *Macworld* will have run a final version of the iMac through its paces and will let you know whether it makes the grade. Go to www.imacworld.com to find out how the iMac did.

### The iMac can't use SCSI devices or PCI cards.

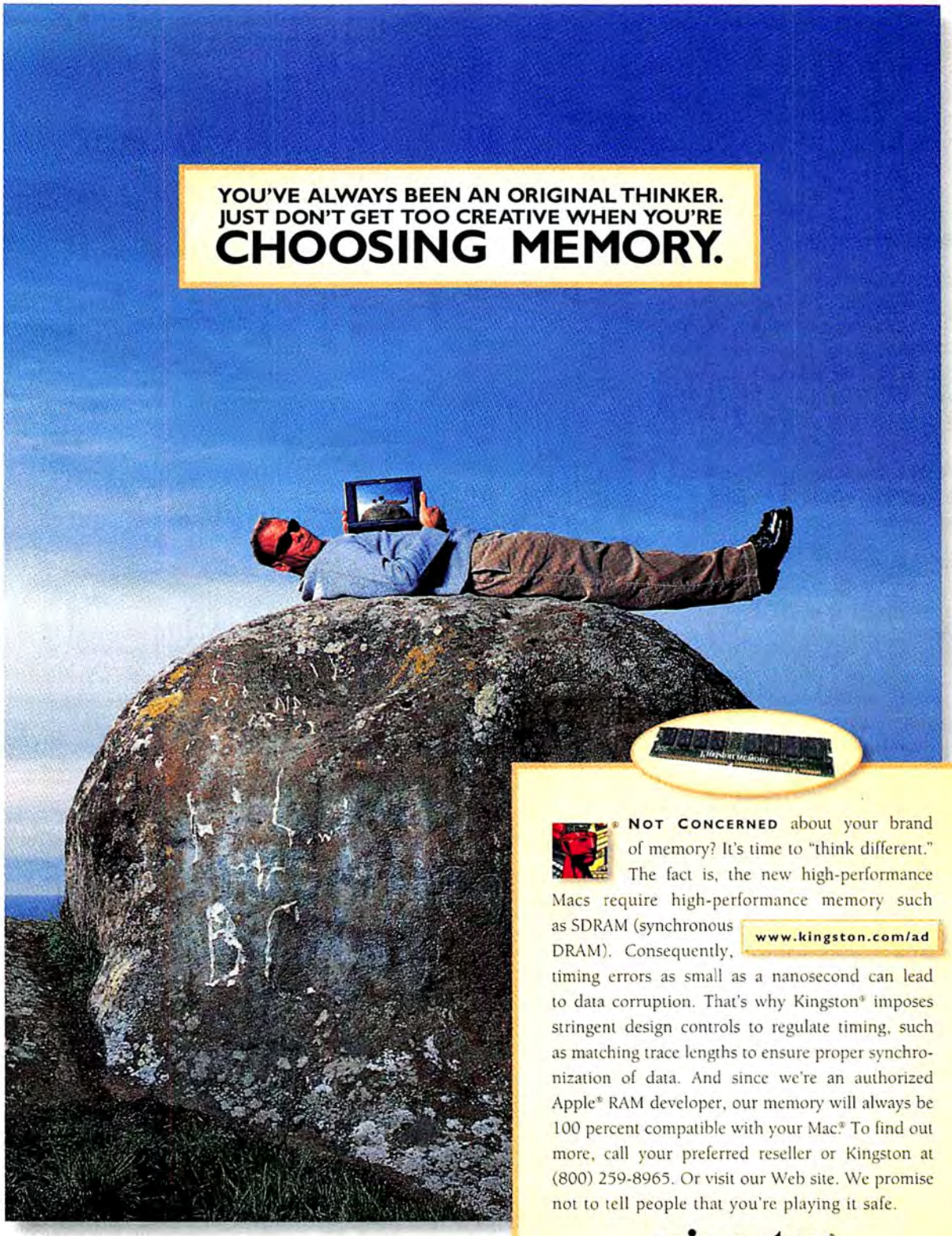
**TRUE** This is bad news if you've got a lot of external SCSI devices such as hard drives; removable-storage drives; scanners; or PCI cards for high-performance video, 3-D acceleration, or ISDN connectivity. At present, there's no way to use any of those devices with an iMac. Nobody has announced a USB-to-SCSI adapter for the Mac so far (although there are a few available for PCs), and even if someone *did* produce one, the slower speed of USB would mean that those devices wouldn't be nearly as speedy as they are with your current Mac.

### The iMac will come in several designer colors, not just blue.

**UNCLEAR** It sure makes sense to us, but Apple is mum about any plans to make iMacs in different colors—or to offer iMacs with slightly different feature sets built to appeal to different audiences. But if the first iMac is a big hit, we'll be the first ones in line for an avocado-green iMac for the kitchen. **m**

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Contributing Editor HENRY BORTMAN specializes in hardware, operating systems, and human-interface issues.




**NOT CONCERNED** about your brand of memory? It's time to "think different." The fact is, the new high-performance Macs require high-performance memory such as SDRAM (synchronous DRAM). Consequently, timing errors as small as a nanosecond can lead to data corruption. That's why Kingston® imposes stringent design controls to regulate timing, such as matching trace lengths to ensure proper synchronization of data. And since we're an authorized Apple® RAM developer, our memory will always be 100 percent compatible with your Mac.® To find out more, call your preferred reseller or Kingston at (800) 259-8965. Or visit our Web site. We promise not to tell people that you're playing it safe.

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The iMac Ushers In a Versatile New Standard for Connecting Peripherals to the Mac

# The USB Connection

by Henry Bortman

THE SLEEK, TRANSLUCENT-PLASTIC BODY of Apple's new iMac may be a design breakthrough, but *inside* the iMac is a radical technology shift that will change the Mac forever—even if you don't plan on ever buying an iMac. Unless you're still plugging away on an original Macintosh 128K, the back of your Mac features the familiar trio of ADB, serial, and SCSI ports—the means by which Mac users connect external devices to their computers. But the iMac doesn't offer any of these. In their place is a strange new connection system (strange, at least, to Mac users): the Universal Serial Bus, or USB.

If this all sounds like a fluke, a quirk of the odd-looking and consumer-oriented iMac, think again. Apple has publicly declared USB to be the future of *all* desktop Macs—and paired with USB will be its higher-speed and higher-end partner, FireWire (a technology that *won't* appear on the iMac). Presumably, PowerBooks will follow suit. That means bye-bye to the ADB, serial, and SCSI devices we use today—unless you use an adapter, and maybe not even then. If you're in the market for Mac peripherals of any kind, you need to keep your eye on USB.

## So Long, Serial Ports

USB is a cross-platform standard developed by Microsoft, Intel, and various PC vendors for connecting low- and medium-speed computer peripherals. It can carry data at up to 12 megabits per second (Mbps)—many times the data-carrying capacity of ADB and serial technology but far less than what SCSI can deliver. That means that the iMac can't really use such fast peripherals as high-performance hard drives, although future desktop machines equipped with a high-speed




New USB drives from SyQuest and Iomega add stylish removable storage to the iMac.

PHOTOGRAPHS BY MARK JOHANN

FireWire port in addition to USB won't have this limitation.

Essentially, USB is a new kind of serial technology, completely different from previous serial technologies available on either Macs or PCs (see the diagram, "USB at a Glance"). USB boasts fast data-transmission rates; simple snap-in connections; and a structure that lets you string together a large number of different devices, such as keyboards, mice, printers, digital cameras, digital speakers, and digital telephones. Unfortunately, although there is a growing array of USB products available for PCs, most of them currently lack the software needed to make them work with the iMac.

**Fast and Flexible** Modern Mac serial ports have a maximum throughput of 230 Kbps; ADB is even slower. USB can move data at 12 Mbps, which means, for example, that a scanner, a printer, and a mouse should be able to communicate with the iMac simultaneously without noticeable degradation in the performance of any of the devices. (That's the theory, at least. Macworld Lab has yet to put the theory to the test.)

Standard Mac serial ports let you operate only one device at a time from any given port, which can be quite a limitation. But USB can support up to 127 devices connected on a single bus.

Now, those who've ever tried to daisy-chain a handful of SCSI devices know just how impossible the idea of connecting 127 devices to your computer sounds. But USB isn't like SCSI: there are no device IDs to set, for one. You also don't have to attach all your USB devices together in one continuous chain. Instead, USB devices can branch out from the original source—your computer—by using USB *hubs*.




**Floppy Saver** Imation's $189 USB SuperDisk will add floppy and removable-storage support to the iMac.

**What's the Hubbub?** Anyone who's set up an Ethernet network understands what a hub is, but they're new to the world of Mac peripherals. A hub is a special USB device whose sole purpose is to enable you to attach more devices to your USB chain.

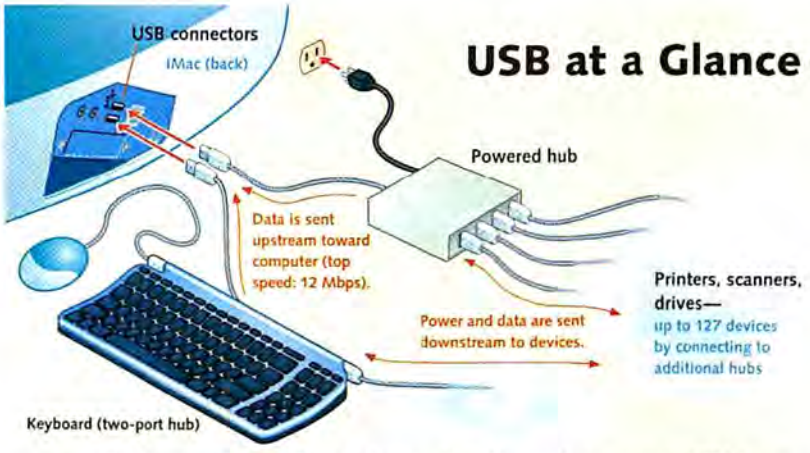
USB hubs—they run between $70 and $130, depending on how many ports they provide—are also responsible for detecting when devices are attached to or detached from the bus. Thanks to USB's built-in traffic cops, you don't have to worry about assigning each device a unique ID as you would with SCSI devices—your computer's USB controller handles it all.

USB's ports and plugs are similarly foolproof. There are two distinct types of USB connectors: the rectangular connector used for plugging devices in to ports on a computer or a hub, and the squarish connector used for plugging in the cable that points back toward the source computer (see the screen shot "Hub of Plenty"). The point of all this is that you'll never be able to plug in a USB cable the wrong way—it simply won't fit.

Once you connect a hub to a USB chain, you can then connect several other devices to that hub. For example, you can connect three devices and *another* hub to a hub, and then connect two devices and two more hubs to that hub, and so on, adding hubs and devices until you attach your 127th device.

**Plug Away** USB devices are hot-pluggable—you can plug and unplug them at will, even when your computer is on, and you don't need to restart your iMac to use a newly attached device. When a USB hub detects that a new device has been attached, the Mac configures the device and loads its driver automatically. While non-USB Macs will let you hot-swap a serial device or an ADB device, you typically have to restart your computer before the device will work.

Despite its advantages, however, USB hasn't really caught on yet. Although PCs with USB ports have been shipping for some time, no PC manufacturer is thinking of putting out a USB-only machine. With the release of Windows 98, which offers native USB support, the PC side may finally be on the way toward adopting USB more widely. And who knows? The existence of a USB-only computer such as the iMac could be the factor that gives USB critical mass.




Unlike current Mac serial ports, which are limited to one device per port, USB lets you attach up to 127 different devices at once. To add devices, just add *hubs*, small devices that give you more places to plug in USB peripherals. The iMac's keyboard itself is a hub, with two ports—one for the iMac mouse, the other ready for some other USB device.

## Chain of Pain?

You might also be wondering what your experience as a user is going to be if you attach a host of peripherals to your iMac. True, the USB spec says you can connect

ARNE HURTY

up to 127 devices. But if you're using USB for playing digital audio, backing up your hard disk to a Zip drive, downloading your e-mail over a USB ISDN connection, printing a document, and mousing around all at the same time, will the mouse get jerky?

Not according to developers. It all depends on the kind of device you're using, how much data needs to be sent back and forth between it and the computer, and how critical the timing of that data transmission is. You could potentially accomplish all those tasks without the mouse's being affected, although the background tasks—printing, downloading, file copying—would slow down, particularly if you simultaneously tried to use a device, such as a scanner or video camera, that needed to transfer a lot of data without being interrupted.

The fact is, we can't tell you from experience where the bottlenecks are. We haven't seen enough USB devices to get a real feel for the situation. The experience of certain sick PC users who've tried to attach as many USB devices as possible shows that while 127 printers can share space without much of a slowdown, 127 videoconferencing cameras can't. And by the way, don't think you can avoid this problem by divvying up the device load between the iMac's two USB ports. Although there are two ports, they're on the same bus.

Additionally, the Mac OS isn't the most robust operating system in the world; background tasks often degrade even without having USB in the mix. What we can tell you is that your experience will be affected as much by the quality of the drivers that companies write for their products as by the limitations of USB technology itself.

### I Want My USB

It's usually not difficult to convince people that USB is a good idea—in theory. But then the light dawns: Hey, if this is the only way I can connect things to my iMac, and companies have only started to take the USB plunge, where am I going to find stuff to connect? And will it cost me a mint to hook up the stuff I already own?

There are dozens, perhaps even hundreds, of USB products for PC users. That sounds like good news, since one of the benefits of USB is that it enables a hardware maker to build a single device that will work on both PCs and iMacs, without the need for special connectors or adapters.

**Driver Dilemma** But there's a catch. Even though the device itself may be able to plug into your new USB-endowed iMac, it won't work without a *driver* (the software that enables a computer to control the device). PC drivers for USB devices won't work on the iMac, and unfortunately, many USB-device companies that market to PC users haven't even

## USB FOR EVERYONE

WOULDN'T YOU KNOW IT: WHILE CUSTOMERS ANXIOUSLY await the arrival of USB products they can use with their iMacs, some USB products are all dressed up with nowhere to go—at least not yet.

Take the case of monitors with USB hubs built into them: a great idea, along the same lines as having AppleVision monitors with ADB ports built-in. ViewSonic (www.viewsonic.com), NEC (www.nec.com), ADI (www.adi.com.tw/), and other companies will offer such devices. ViewSonic's MB110 Monitor ($1,199), which sports built-in Nakamichi speakers and a built-in microphone, also contains a four-port USB hub. NEC is taking a slightly different approach: the company is providing replacement monitor bases, dubbed Intellibases, for its entire line of existing CRT monitors. The bases are USB-enabled, containing either digital speakers ($79), a four-port USB hub ($89), or both ($129).

What's wrong with this picture? The iMac has no monitor port for attaching an external display. So, while these products might be useful when USB comes to Apple's professional desktop line, for now they're kind of beside the point. For the record: don't believe people who tell you that the video signal being sent to these monitors travels over USB. It's not true. The built-in USB-hub capability is merely a convenience; it has nothing to do with the monitor per se.

Meanwhile, three companies—ADS Technologies, Keyspan, and Newer Technology—have announced USB controller cards for PCI-based Macs. These PCI cards will enable existing Power Macs (all except the original NuBus models) and clones to support USB. The catch is that the cards can't ship until Apple finishes the accompanying system extensions. And Apple's not talking about when that might come to pass—or what version of the Mac OS will be required when it does.

ADS will also offer a CardBus-based USB controller card that will give the latest PowerBook G3 notebooks USB.



**Hub Cap** Future desktop Macs with USB will be able to utilize the USB hub built into monitors such as this flat-panel display from ADI.

*decided* to write Mac drivers for their products, let alone completed them.

Still, the list of products that will be available for use with the iMac around the time it ships is impressive (see the table, "Links in the Chain: 28 Selected Mac USB Products"), considering that Apple first made developers aware of the iMac in May of this year.

**Storage Devices** Imation will offer a USB version of its SuperDisk drive that's designed to look a lot like the iMac itself. This drive supports two media types: 120MB removable cartridges and standard 1.44MB floppies. Newer Technology will offer a stylish floppy-only drive—with the added attraction of two built-in serial ports to replace the ones Apple has taken away.

The two giants of removable media, Iomega and SyQuest, will both offer USB-based drives in translucent plastic. Iomega's entry is a blue Zip drive; SyQuest will counter with a red 1GB SparQ drive. Although SyQuest has been selling the SparQ on the PC side since late last year, the USB SparQ will mark the first time this drive has been available to Mac users.

**Printers** There are currently no USB printers targeted for the Mac market. However, several ink-jet printers—from Alps, Epson, and Hewlett-Packard—designed to connect with a PC's parallel port will be bundled with parallel-to-USB adapters and Mac drivers. Owners of Mac ink-jet printers can only hope that other companies develop the serial-to-USB converters and drivers, if any, needed to make those printers work with USB.

**Imaging** Umax has announced a USB scanner, the Astra 1220U. Most other scanners have SCSI interfaces, and no companies have yet announced a SCSI-to-USB adapter. Although Visioneer (www.visioneer.com) recently announced a USB version of its PaperPort scanner for Windows, the company says it has no current plans to develop a Mac driver for it.

**Keyboards** Aside from the keyboard that comes with the iMac, there aren't many options available in this category yet. However, given that Apple has already written a generic USB keyboard driver, most USB keyboards designed for the PC market should work on a Mac

## LINKS IN THE CHAIN: 28 SELECTED MAC USB PRODUCTS

| Company | Product | Company's Estimated Price | Phone | Web Address | Estimated Date of Availability |
|---|---|---|---|---|---|
| Alps | USB cable | less than $99 | 408/432-6000 | www.alpsusa.com | early September |
| CH Products | FlightStick Pro | $49 to $59 | 650/598-2518 | www.chproducts.com | September or October |
| | GameStick | $29 | 650/598-2518 | www.chproducts.com | September or October |
| Entrega | USB hubs | $130 | 949/859-8866 | www.entrega.com | early August |
| Gravis | GamePad Pro USB | $30 | 650/572-2700 | www.gravis.com | early October |
| Griffin Technology | iMate | $29 | 615/255-0990 | www.griffintechnology.com | when iMac ships |
| Imation | USB SuperDisk | $189* | 888/466-3456 | www.imation.com | when iMac ships |
| Iomega | USB Zip | less than $150 | 801/778-1000 | www.iomega.com | September |
| Kensington | Mouse-in-a-Box Scroll USB | $30 | 650/572-2700 | www.kensington.com | early September |
| Kernel Productions | JoyPort USB | $50 | 302/456-3026 | www.kernel.com | September or October |
| Keyspan | Keyspan USB Serial Adapter | $79 | 510/222-0131 | www.keyspan.com | October |
| | USB hub | $89 | 510/222-0131 | www.keyspan.com | October |
| La Cie | USB DVD-ROM | to be determined | 503/844-4500 | www.lacie.com | November |
| | USB portable hard drive | starts at $499 | 503/844-4500 | www.lacie.com | August |
| Macally | Macally One-Button Mouse | $40 | 626/338-8787 | www.macally.com | when iMac ships |
| | Macally Keyboard | $60 | 626/338-8787 | www.macally.com | September |
| | Macally Trackball | $50 | 626/338-8787 | www.macally.com | when iMac ships |
| Momentum | uConnect | $69 | 425/893-8100 | www.momentuminc.net | when iMac ships |
| | uPrint | $99 | 425/893-8100 | www.momentuminc.net | September |
| Newer Technology | iFloppy | $75 | 316/943-0222 | www.newertech.com | October to December |
| | iHub | $85 | 316/943-0222 | www.newertech.com | October to December |
| | iSerial | less than $40 | 316/943-0222 | www.newertech.com | September |
| Opcode Systems | DATport | under $200 | 650/856-3333 | www.opcode.com | mid-September |
| Peracom | USB Quad Hub | $99 | 919/379-2700 | www.peracom.com | available now |
| SyQuest | SparQ | $199 | 510/226-4000 | www.syquest.com | October to December |
| ThrustMaster | Top Gun USB Joystick | $50 | 503/615-3237 | www.thrustmaster.com | September |
| Umax | Astra 1220U | $179* | 510/651-4000 | www.umax.com | September |
| Zoom | ZoomCam USB | $100 to $129 | 617/423-1072 | www.zoomtel.com | September |

*List price.

as well. With any luck, some of the companies that currently make ergonomic keyboards only for PCs will use USB as an excuse to bring their wares to the Mac. Right now, PC-to-Mac keyboard adapters typically cost Mac users an extra $200 to $300.

**Mice** As with keyboards, there are plenty of choices on the PC side. But again, although the iMac ships with a generic mouse driver, most PC mice have two or three buttons, and they will require custom drivers that support the programmability of those extra buttons. Kensington and Macally have both announced that they'll offer USB mice, for those who don't want to use the iMac's cute—but ergonomically dubious—rounded mouse.

**Joysticks and Game Pads** Good thing this category is looking pretty solid, considering all the hype from Apple about how great the iMac is as a gaming machine. Look for offerings from CH Products, Gravis, Kernel Productions, and ThrustMaster.

**Other Stuff** That's not the end of the list. Several companies sell USB hubs that don't require any special software. In July, Steve Jobs announced that there would be a USB cradle for the PalmPilot, although 3Com itself remains mum on the topic. And other USB products, such as speakers and ISDN modems, will probably also spring up in the next year.



**Hub of Plenty** USB plugs and ports come in two shapes: rectangular (left-hand plug), for connections heading away from the host computer, and square, for connections heading back to the host computer.

| Description |
|---|
| parallel-to-USB adapter and drivers for MD-1000 and MD-1300 printers |
| joystick |
| joystick |
| |
| game pad |
| ADB-to-USB adapter |
| 120MB removable-media drive that also reads and writes 1.44MB floppy disks |
| 100MB removable-media drive |
| mouse with scrolling wheel |
| USB joystick adapter |
| serial-to-USB adapter |
| four-port hub |
| DVD-ROM drive |
| 4GB and 9GB hard-disk drives |
| one-button mouse |
| full-size keyboard with built-in two-port hub |
| trackball |
| serial-to-USB adapter |
| parallel-to-USB adapter for Epson Stylus and HP DeskJet printers |
| 1.44MB floppy-disk drive with two serial ports |
| four-port hub |
| serial-to-USB adapter (two serial ports) |
| audio interface |
| four-port hub |
| 1GB removable-media drive and one cartridge |
| joystick |
| 36-bit 600-by-1,200-dpi color scanner |
| compact color video camera |

## Making the Conversion

It's all well and good that iMacs will have a bunch of new peripherals to connect to. But what about all that stuff you've already got lying around?

We're sorry to say that there's no one-size-fits-all solution. But don't throw those old devices away yet. There's still hope, in the form of adapters that will let you connect non-USB devices to USB-only computers. (And down the road, when new desktop Macs come out with USB, odds are good that you'll be able to get PCI adapter cards with various combinations of SCSI, serial, and ADB ports.)

For people with serial-based printers, several companies—Keyspan, Momentum, and Newer Technology among them—will offer serial-to-USB adapters. The problem is that you'll still need drivers for your serial devices.

Or maybe you won't. As *Macworld* researched this article, we heard comments ranging from "There's no way to support a Mac serial product with a USB adapter" to "Any serial device that has a Mac driver that works with Mac OS 8.1 should work equally well when connected to an iMac through a serial-to-USB adapter." With that kind of confusion, is it any wonder that at press time, none of the companies making these products had prototypes we could test?

The answer, most likely, is that some devices will work with a generic driver, some will require a special driver, and some won't work at all. Which products will end up on which of these lists, however, is still unclear. A word to the wise: before you shell out your hard-earned cash for a serial-to-USB adapter, make sure the manufacturer guarantees that the adapter will work with *your* serial device—and that you can return the adapter for a full refund if it doesn't.

And then there's the small matter of higher-speed devices—in short, forget about it. USB isn't designed to support superfast storage devices such as RAID arrays, and the iMac isn't the machine to use them with. Nor should you bank on capturing full-resolution, uncompressed digital-video streams from video cameras or VCRs.

## The Last Word

It seems like only yesterday that nobody had even heard of USB. But the Mac is moving to this new bus architecture, and the little iMac is leading the way. By this time next year, the Mac's ADB and serial ports will be history, and USB (along with FireWire) will reign supreme.

That may seem like an overly optimistic prediction, considering the relative lack of available USB devices. But the iMac's success—yes, this assumes that it will be successful—will cause hardware companies that have been waffling on the USB issue to finally take the plunge.

Like any transition, this one will no doubt have its rough spots. But it will all be over soon enough. So don't try to fight it. Get on the bus. USB is in your future. **m**



# New Scanners, Printers, Cameras Give You Professional Power at Mind-Blowing Prices








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Focus On . . . Page 83

Print Out . . . Page 91





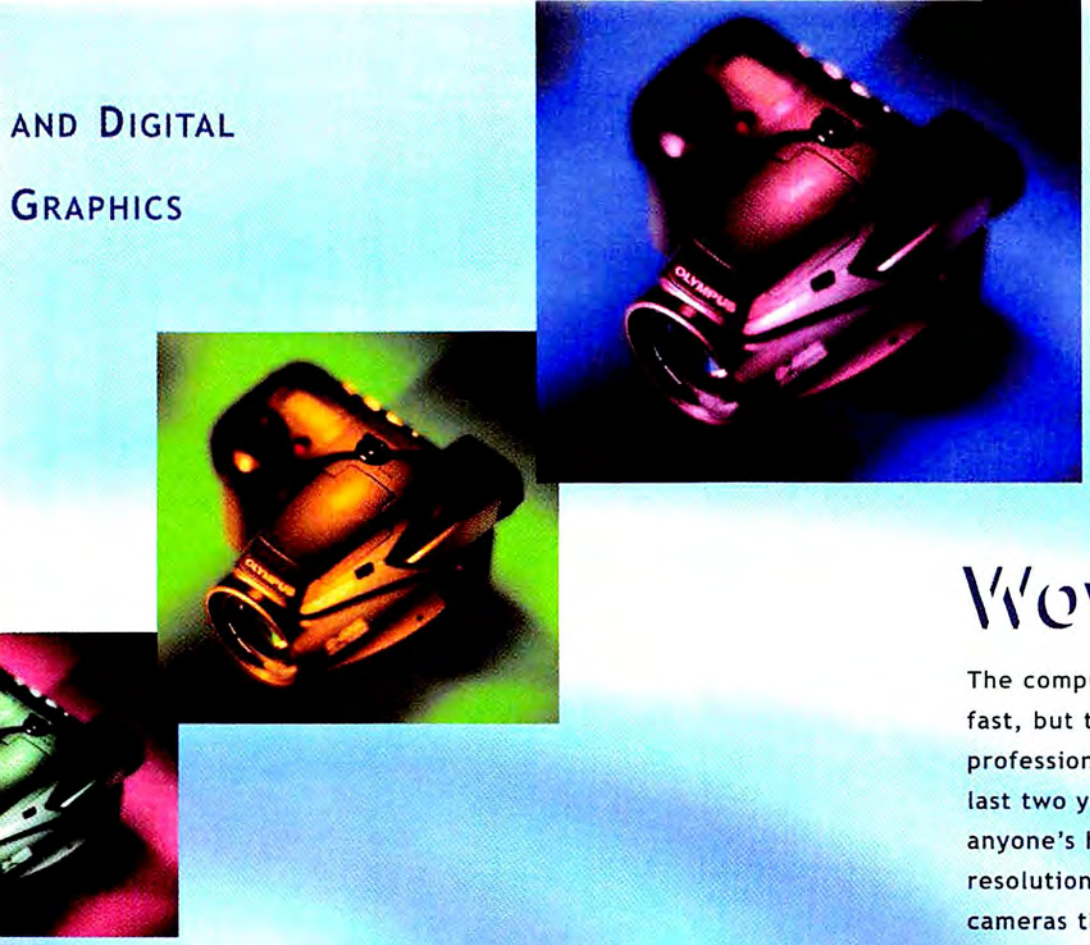



Photographs by Mark Johann

Swirl imaging by John Lund

AND DIGITAL

GRAPHICS



# The Imaging REVOLUTION

## Wow!

The computer industry moves fast, but the changes graphics professionals have seen these last two years would make anyone's head spin. High-resolution scanners and digital cameras that sold for $10,000 or more cost less than half that today, and for $300 you can buy a color printer that makes images so impressive that many people would proudly hang them on a wall. Macworld Lab tested 22 new graphics products to find the ones leading this digital-imaging revolution. Whether you need to scan, snap, or print, these tools can do more than just liberate you from the service bureau. By bringing professional graphics power down to a price more of us can afford, they're changing the way we see the world.







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|---|---|---|---|---|---|---|
| MultiSync LCD2010™ | 20.1" | 1280x1024 | 27.6 lbs/16.9 lbs w/o stand | yes | yes | yes |
| MultiSync LCD1810™ | 18" | 1280x1024 | 22 lbs/12 lbs w/o stand | yes | yes | yes |
| MultiSync LCD1510™ | 15" | 1024x768 | 15.4 lbs/8.8 lbs w/o stand | yes | yes | yes |
| MultiSync LCD1510V™ | 15" | 1024x768 | 14.8 lbs/8.3 lbs w/o stand | yes | no | yes |

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*OptiShield protective glass and MicroTouch touch screen available 3rd Quarter, 1998.

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# SCAN IN

## GET PROFESSIONAL-QUALITY IMAGES AT UNHEARD-OF PRICES WITH THESE FIVE SCANNERS



BY BRUCE FRASER

Macworld LAB TEST

Ansel Adams said that if a photographic print is like a musical performance, then its negative is like the score. But things work differently in the digital realm: to create a great print with your Mac, your essential starting point is a great scan. Even if you manipulate your image with an unlimited number of filters and effects, it's your initial scan that sets the limits when you reproduce artwork or photography. For this reason, it's important to pay careful attention to the scanner itself—its hardware and software determine just what digital information you can capture.

Until recently, a scanner flexible enough to deal with most graphics professionals' needs could be had only for tens of thousands of dollars. Today, however, a new generation of scanners has appeared that can satisfy almost all your scanning needs at a mere fraction of that cost.

We looked at five flatbed scanners that fill the bill. All have street prices below $4,000 and offer high enough resolutions and wide enough dynamic ranges to handle almost any kind of original intended for almost any kind of hard-copy or electronic output. The range of the scanners' resolution—800 by 1,600 dpi to 1,200 by 2,400 dpi—is sufficient to handle the vast majority of image-reproduction requirements but is on the low side for 35mm originals, unless you're reproducing them at small sizes. Users who need to scan predominantly 35mm film may be better served by a dedicated 35mm scanner.

### EXPERT EYES

The ultimate test of a scanner is the image it produces, so we tried to get the best scan we could out of each scanner with challenging test images. The images, whether reflective or transmissive, contained heavily saturated colors, delicate pastels, flesh tones, and complex near-neutrals that wandered from warm to cool—in short, they were a scanner operator's nightmare. Three of the scanners featured some kind of intelligent-scanning-agent software, so we produced additional scans with these automatically. We then gave the scans to a jury of color experts, which evaluated them for color fidelity, tonal range, neutral balance, and sharpness. We also measured the dynamic range of the scanners to find out how far into the shadows they could see and looked at the all-important scanner-control software to discover how easy it was to produce good scans.

The jury results we obtained were surprisingly similar. The jurors gave most of the scanners a score of 4 out of a possible 7 in most categories—a 1 is completely unacceptable, and a 7 represents a client sign-off (see the benchmark, "More Than Meets the Eye"). If this seems disappointingly low, bear in mind that it's extremely rare for a client to sign off on a first scan. All the jurors displayed their own subtle biases, just as clients do in the real world. We're fairly confident that if we had treated the jurors as clients and determined their particular areas of concern (such as the color of a specific element in the image), we could have produced second scans tailored to each one's tastes and achieved higher scores.





The jury's opinions did prove that these midrange scanners are very similar in their basic capabilities, making software and price key factors.

## HARD FACTS

Software is often what sets a scanner's image quality apart, but its basic capabilities spring from its hardware (see the table, "Professional Quality, Reasonable Price: Five High-Quality Scanners"). If the scanner captures only enough pixels to print at letter size, you simply won't be able to produce a double-page spread, and if it sees only the dynamic range that encompasses prints, you won't be able to pull shadow details from the wider tonal range of film. Both of these important qualities—resolution and dynamic range—are determined by hardware.

Although each of the five scanners we tested was labeled with a different manufacturer's name, we tested only three different scanner *mechanisms:* the Agfa DuoScan (www.agfahome.com) has the same hardware as the Microtek ScanMaker 5 (www.microtekusa.com). Similarly, Heidelberg Color Publishing System's LinoColor Saphir Ultra 2 (www.linocolor.com) is based on the same mechanism as the Umax Technologies PowerLook III (www.umax.com).

**Resolution** The number of pixels the scanner can capture determines at how large a size you can reproduce an image without losing quality. All the scanners we tested have *asymmetrical resolutions*—they capture more pixels in one direction than in the other—so the manufacturers' specifications always quote two figures for resolution, such as 800 by 1,600 dpi.

Flatbed scanners capture images one row of pixels at a time. A *stepper motor* pushes the scanning head along the length of the image, capturing successive rows of pixels until it records the complete image. The lower number in the resolution spec always refers to the resolution of the sensor—the CCD (charge-coupled device)—that actually records the light from the image you're scanning, and hence to the number of pixels in each row. The larger number refers to the increment by which the scanning head moves and, hence, to the number of rows of pixels the scanner can capture.

Conventional wisdom has it that the lower figure is the only one that matters for images—that there's no point in making a 600-dpi scan on a 300-by-600-dpi scanner. But with these scanners this isn't the case. We were surprised by the quality of the 2,000-dpi scans from the 1,000-by-2,000-dpi Agfa Duoscan and the Microtek ScanMaker 5, and even more so by the 2,400-dpi scans from the 1,200-by-2,400-dpi LinoColor Saphir Ultra 2 and Umax PowerLook III. The 800-by-1,600-dpi Epson Expression 836XL was more of a borderline case—its 1,600-dpi scans were noticeably softer than those from the higher-resolution scanners. For originals larger than 35mm, however, all the scanners we tested have high enough resolutions for almost any practical purpose.

**Dynamic Range** The other key property of a scanner engine is its dynamic range. Dynamic range, usually measured in terms of optical density (OD), is simply the range of light and shadow the scanner's CCD can record.

When the CCD receives too much light, it creates so much charge that electrons spill over into the neighboring sensors and create a white blob, known as *blooming*. If the sensor receives too little light, the system's inherent noise overwhelms the weak signal produced by low light levels.

The wider a scanner's dynamic range, the more bits it requires to divide that range smoothly and avoid posterization or banding. But there's no *direct* relationship between dynamic range and bit depth.

When we tested the scanners' dynamic range, our results

## PROFESSIONAL QUALITY, REASONABLE PRICE: FIVE HIGH-QUALITY SCANNERS

| Company | Product | Mouse Rating | Price (list/company's estimated) | Phone | Maximum Scanning Area (in inches) | Transparency Adapter Option |
|---|---|---|---|---|---|---|
| Agfa | DuoScan | ●●●½ | $2,995/$2,995 | 978/658-5600 | 8.0 × 14.0 reflective | included (8.0 × 10.0 in.) |
| Epson | Expression 836XL | ●●●½ | NA/$2,499 | 310/782-0770 | 12.2 × 17.2 | $500 (11.4 × 16.5 in.) |
| Heidelberg Color Publishing System (CPS) | EDITORS' CHOICE LinoColor Saphir Ultra 2 | ●●●● | $3,695/NA | 516/434-2050 | 11.7 × 8.5 | included (10.0 × 8.5 in.) |
| Microtek | ScanMaker 5 | ●●●½ | NA/$2,499 | 310/297-5000 | 8.0 × 14.0 | included (8.0 × 10.0 in.) |
| Umax Technologies | PowerLook III | ●●●½ | $3,695/$3,695 | 510/651-4000 | 8.5 × 11.7 | included (8.5 × 10.0 in.) |

*NA = not available.* *Optical density of the densest piece of film the scanner can read, according to scanner's manufacturer.*

agreed with vendor claims with four out of the five scanners: we found the claim of a dynamic range of 3.3 OD for the Epson Expression 836XL to be slightly on the optimistic side. The Epson has a narrower dynamic range than the other scanners, limiting its ability to capture shadow detail from high-contrast transparencies. However, the dynamic range of all five scanners is more than adequate for scanning prints or negative film and all but the densest transparencies.

## SCANNING SOFTWARE

All five scanners capture at least 36 bits per pixel internally. But if all your output is 24-bit, what use are all those extra bits? They're useful only if you take advantage of them by optimizing contrast and color balance during the scan. No matter how good the scanner hardware, if the scanner software doesn't let you select the *right* 24 bits to output, the extra bits will basically go to waste.

**Scanning on Autopilot** One way to take advantage of the extra bits is to get intelligent software to do the work for you. Agfa's FotoLook performs intelligent scanning; the LinoColor scanner's LinoColor Elite software has a built-in agent called ColorAssistant; the Microtek ScanMaker 5 is bundled with ScanPrepPro, from ImageXPress (770/564-9924, www.scanprep.com); and Umax's PowerLook III includes binuscan PhotoPerfect Master (212/681-0600, www.binuscan.com). (Epson's scanner doesn't include any intelligent-scanning software.)

Our jury liked the additional sharpening done by ScanPrepPro and, to a slightly lesser extent, by ColorAssistant. ColorAssistant actually received the best score overall (for a closer look at the differences in the scanners' output, see the sidebar, "A Feast for the Eyes").

In the end, the differences between the hand-tuned and autoscanned images were quite small, especially considering that our test image was extremely challenging, even for a skilled human operator. In general, all four automatic scans were very good. Of all the agents, however, ColorAssistant did an especially good job.

**Scanning by Hand** For manual scanning, Microtek's ScanWizard offers the most-rudimentary controls. The prescan window is quite small, but more annoying is that you can see the effects of adjustments such as gamma tweaks only on a tiny postage-stamp–size version of the image—the prescan doesn't get updated until you close the image-adjustment window.

Umax's MagicScan offers basically the same controls as ScanWizard but with a resizable, zoomable prescan that lets you use the controls with more precision. Both ScanWizard and MagicScan gave us less control than we felt the hardware required. We were able to obtain the best results by simply transferring all the data from these scanners into Photoshop, where we could use a more capable set of tools to edit the high-bit data.

The software that comes with the Epson Expression 836XL—the SilverFast plug-in, from LaserSoft Imaging (310/521-9388, www.lasersoftint.com)—is considerably more full-featured. It includes full support for ColorSync, which helps integrate it into the new color architecture of Photoshop 5.

Agfa's FotoLook likewise offers ColorSync support and also allows you to perform selective color corrections on a specific range of color in addition to the global adjustments the preceding packages offer. The Agfa package also includes FotoTune, a full-featured profile-creation package that allows you to create or fine-tune ICC color-matching profiles for input and output devices and monitors.

The most full-featured scanning software available in this group, however, is the LinoColor scanner's LinoColor Elite 5.0. Essentially the same software used to drive high-end

| Bundled Software | Optical Resolution (in dpi) | Dmax* | Bit Depth | Comments |
|---|---|---|---|---|
| Adobe Photoshop (scanner is $2,795 without Photoshop), FotoLook, FotoTune | 1,000 × 2,000 | 3.4 | 36 | This scanner's powerful software is hampered by the cumbersome implementation of some features. Glassless film holders are a nice extra. |
| Adobe Photoshop LE, Epson TWAIN Pro, ISIS driver, LaserSoft SilverFast, Monaco System Color Calibration | 800 × 1,600 | up to 3.3 | 36 | This scanner has the lowest resolution and narrowest dynamic range of our group but offers tabloid-size scanning and quite capable software at a low price. |
| Fonts Just in Time, LinoColor Elite 5.0, ScanOpen ICC, TextBridge | 1,200 × 2,400 | 3.4 | 42 | High resolution, wide dynamic range, and very powerful software make this scanner our pick despite its manual scanning software's steep learning curve. |
| Adobe Photoshop LE, Caere OmniPage LE, MetaCreations Painter 5.0, ScanPrepPro, ScanWizard | 1,000 × 2,000 | up to 3.6 | 36 | Rudimentary software doesn't do hardware justice, although it comes at a low price. Glassless film holders are a nice extra. |
| binuscan PhotoPerfect Master, LivePicture for Macintosh, MagicScan, MetaCreations Painter 5, Wacom Artpad II, Wright Design 2.0 | 1,200 × 2,400 | 3.4 | 42 | High resolution, wide dynamic range, and strong batch-scanning features are unfortunately accompanied by weak scanning software. Includes extensive set of bundled graphics applications. |

# A Feast for the Eyes

THE ULTIMATE TEST OF A SCANNER IS THE IMAGE IT produces, so to make these professional-quality scanners prove their mettle, we used them to reproduce an image that could be described only as a scanner operator's nightmare.

Our photograph contains strong and saturated colors, delicate pastels, familiar objects with familiar colors, and lots of elements that at first glance might look as though they should be neutrals but in fact are not. The image also contains a classic example of colors that may result in scanner *metamerism*—a phenomenon in which the scanner sees two colors as being the same, whereas our eyes see them quite differently.

The accompanying images show how each scanner fared. Our scanner operator felt that the hand-tuned scan from the Saphir Ultra 2 was the closest to the original, but overall, the jurors liked the ColorAssistant scan from the Saphir Ultra 2 the best.



**Professional Drum Scan** This commercial drum scan captures most of the nuances of the image, but as is typical with commercial drum scans, it's also heavily sharpened. It does, however, provide a useful frame of reference for our tests.



**Agfa DuoScan** The Duoscan's FotoLook software allowed us to produce a faithful rendering of the original, including the complex interplay of greenish and pinkish shadows under the eggbeater.



**Agfa DuoScan on Autopilot** Agfa's FotoLook produced a reasonably good automatic scan. The flesh tones are a little gray, and some shadow detail is lacking.



**Epson Expression 836XL** The Epson Expression 836XL gave us a pleasing scan, but it oversaturated and shifted some colors.



**Microtek ScanMaker 5** The ScanMaker 5 produced a reasonably good scan, but the orange and the yellow peppers are quite unsaturated.



**Microtek ScanMaker 5 on Autopilot** ScanPrepPro produced a pretty good scan from the Microtek ScanMaker 5, but it lost some shadow detail and rendered some colors quite inaccurately.



**Saphir Ultra 2** The control the LinoColor software offers allowed our scanner operator to produce faithful rendering of the original, although the disagreement of the jury shows the subjective nature of color judgments.



**Saphir Ultra 2 on Autopilot** The ColorAssistant software did a splendid job and arguably produced the best scan, certainly according to the jury. There's little here to complain about.



**Umax PowerLook III** With the MagicScan software that drives the Umax PowerLook III, we found ourselves chasing correct color rather unsuccessfully. We obtained better results when we simply transferred a raw 42-bit scan into Photoshop.



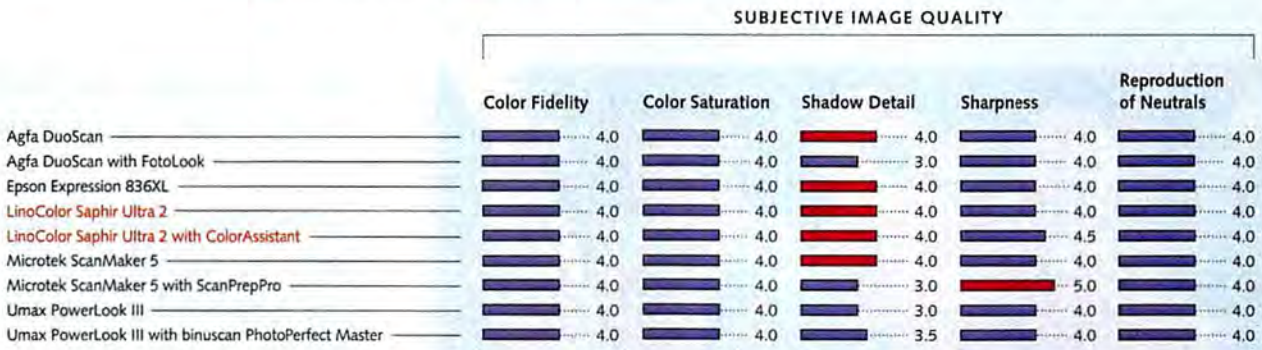
**Umax PowerLook III on Autopilot** We got a pleasant but somewhat inaccurate rendering from binuscan PhotoPerfect Master, particularly in the reds. The red pepper is too bright and too saturated.

Macworld LAB TEST

# More Than Meets the Eye

We used a jury of graphics experts to evaluate scans from each scanner. The overall scores were all very close. The scans made with automatic scanning software scored particularly well, especially the ColorAssistant scan from the LinoColor Saphir Ultra 2. Our jurors displayed individual biases, just like real clients, providing a reminder that while we often ask the scanner operator to match the original, what we often want is a *pleasing* image rather than one that replicates the original exactly.

**Best overall quality. Editors' Choice winner's name in red. Higher numbers and longer bars are better.**




## Behind Our Tests

Image Quality scores were awarded by a jury of six graphics experts, who reviewed output from each scanner printed by a Kodak Desktop Color Proofer 9000. Test images consisted of a reflective print and two transparencies. We tried to achieve an optimal scan manually, but also scanned using automated settings if this capability was present in the bundled software. Jurors were asked to rate both the hand-scanned and auto-assisted images on a scale from 1 to 7, where 7 referred to the original prints and films. The represented scores are the median scores from the entire jury.—**Macworld Lab testing supervised by Jeffy Milstead**

LinoColor drum scanners, LinoColor Elite offers unparalleled ColorSync support; three types of selective color correction; and very precise control over saturation, overall color balance, and shadow and highlight gradation.

The only downside is this software's steep learning curve: LinoColor Elite's control interface uses somewhat daunting LCH (lightness, chroma, hue) controls. The time you invest learning LinoColor Elite, however, will pay off in terms of both scan quality and productivity. While you're getting up to speed, the automatic ColorAssistant intelligent agent does a great job of keeping you on the right track.

### MACWORLD'S BUYING ADVICE

All five scanners are well worth considering, but the LinoColor Saphir Ultra 2 is an exceptional value, provided you're willing to invest some time in learning its software. Agfa's Duoscan is a close second, and the Epson Expression 836XL, despite its relatively low resolution and smaller dynamic range, is notable as one of the least expensive scanners we reviewed and the only one that scans reflective originals as large as tabloid-size. The Umax PowerLook III and the Microtek ScanMaker 5 are both excellent units, but their control software is only fair when compared with the other scanners' more full-featured offerings. Each unit offers a lot for the price, though. The Microtek is one of the least expensive scanners, and the Umax—although expensive—offers high resolution and bit depth and comes with a tremendous bundle of goodies, including LivePicture and a Wacom ArtPad tablet.

As you make your decision, take into account that these scanners offer a variety of bundled applications—you may not need another copy of Photoshop, but a copy of ScanPrepPro or Agfa's FotoTune just might tip the scales.

Rest assured, all these scanners offer quality and flexibility at a price that would have been unthinkably low only a year ago. If you've been thinking of bringing scanning in-house, there's never been a better time to do so. m

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Contributing Editor BRUCE FRASER is currently hard at work writing the successor to *Real World Photoshop 4* (Peachpit Press, 1997), which will—daringly—be entitled *Real World Photoshop 5*.

## EDITORS' CHOICE

**LinoColor Saphir Ultra 2** Outstanding hardware makes the Saphir Ultra 2 a sound purchase, but it's the powerful (and *challenging*) LinoColor Elite software that sets this scanner apart. The ColorAssistant intelligent agent helps even novices produce great scans. **Company:** Heidelberg Color Publishing System (516/434-2050, www.linocolor.com). **List price:** $3,695.

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**Friday, August 28, 5:00 pm**
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**Saturday, August 29, 1:00 pm**
*Olu Dara, Alfonzo Blackwell, Cyrus Chestnut, Jonathan Butler*

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# FOCUS ON

## TEN HIGH-QUALITY DIGITAL CAMERAS PUT TO THE TEST BY MACWORLD LAB



BY DEKE McCLELLAND

Macworld LAB TEST

A digital camera may be the most liberating piece of hardware you can buy if you're a graphics pro. After all, next to type, photography is the most essential ingredient of design. And whether you're creating professional-level artwork, laying out the company newsletter, or building a Web site, most of the images you use start with someone looking through a lens.

Until recently, you needed a scanner to digitize your photographs—the poor picture quality of entry-level digital cameras branded them as expensive convenience tools—but digital-camera quality has improved radically. A new class of midrange "megapixel" cameras has emerged, cameras that capture three to four times as many pixels as equally expensive models available this time last year. This means that shooting directly to pixels is now a real alternative, even for quality-conscious pros and consumers without bottomless pockets. Digital cameras can change the way you work—you can literally snap a picture and bring it up on your monitor in less than a minute. The real world becomes an immense stock library just waiting to be downloaded to your hard disk. (And you thought the Internet was big!)

Where the quality of last year's digital cameras was roughly equivalent to what you'd get out of a disposable camera from the drugstore, the new ones provide the same degree of clarity and detail as a snapshot developed at a 24-hour photo lab. The images look great as 4-by-5-inch prints; any bigger, and you start to see the grain (or pixels). This might be all you need, however, if you're a manager or a designer who uses small-format spot images, full-color postcard photographs, or even full-page art on newsprint. And it's especially appealing if you just can't justify shelling out the $10,000 that higher-end digital cameras cost.

### THE BASIC REQUIREMENTS

To be a tool instead of just a toy, your digital camera must meet some basic requirements: you want your images to look every bit as good as if they were shot to film, so picture quality is paramount. You need accurate focus, flash, and framing controls, so you can get precisely the picture you want. Ideally, the camera should be small enough to fit in a pocket or purse, come equipped with rechargeable batteries, and let you take a ton of good pictures before demanding that you download them to your hard disk.

Even if it takes you a few hours to figure out how the heck the thing works, that's a small price to pay for an affordable digital camera that will meet your needs over the long haul. When the workday is over, you may also want a good-quality camera that you *enjoy* using (all work and no play make Jack and Jane quite dull). Otherwise, your money will go to waste after you fight with the camera once or twice and then toss it in a drawer.

To find the best megapixel cameras for work and for home, Macworld Lab tested ten cameras priced between $500 and $2,500. We shot a series of photographs with each camera under controlled conditions and presented them to a jury that





graded them according to color fidelity, sharpness, and other criteria (see the benchmark, "Seeing Is Believing"). I combined these findings with my own extensive field testing to arrive at two Editors' Choice picks: one a powerful performer, Olympus's $999 D-600L, and the other a simple pleasure, Canon's $699 PowerShot A5.

Although these 2 cameras stand out prominently from the others, I have to say that I'd be happy with 7 of the 10 cameras we looked at. Considering that I've reviewed 35 digital cameras in the last four years, most of which I never want to see again, those aren't bad averages.

## IT'S ALL IN THE CCD

Digital cameras capture images by using a photosensitive charge-coupled device (CCD). This photosensitive chip is divided by a grid of electrodes into sectors—*pixels*. These pixels respond to light, thereby acting as the digital equivalent of film. In most cases, the resolution of the CCD translates directly to the highest-resolution image the camera can produce. Some of the pixels around the outside of the CCD get masked away, but otherwise, a pixel on the CCD translates to a pixel in the captured image. As a rule of thumb, a higher-resolution CCD captures better pictures and costs more money.

Technically, a camera earns the label *megapixel* only if the CCD provides 1 million pixels or more. As I write this, half the cameras we looked at—Epson's $799 PhotoPC 700, Kodak's $699 DC210, Nikon's $899 CoolPix 900, and the $799 D-340L and the $999 D-600L from Olympus—meet that demanding criterion. Of the five, the D-600L captures the most information, packing a whopping 1.4 million pixels into its CCD.

Two more cameras—Agfa's $649 ePhoto 1280 and Polaroid's $2,495 PDC-3000—capture fewer than a million pixels apiece but use software interpolation to inflate the resolution. Polaroid even goes so far as to claim that its PDC-3000 provides the largest images of any camera in its class, even though its CCD captures only about 70 percent as many pixels as the Olympus D-600L. But although it's true that you can save a 1,600-by-1,200-pixel image from the PDC-3000, a 1,280-by-1,024-pixel image from the D-600L looks a lot better. (For details about the cameras' image quality, see the sidebar, "You Be the Judge.")

Because of this confusion, we decided that in this article we'd broaden our definition of *megapixel* to include any camera that captures an image of 1,024 by 768 pixels or better. This includes the PowerShot A5 from Canon and the $499 D-320L

## THE WHOLE PICTURE: TEN MEGAPIXEL DIGITAL CAMERAS

| Company | Agfa | EDITORS' CHOICE PERSONAL CAMERA Canon | Eastman Kodak | Epson America |
|---|---|---|---|---|
| Product | ePhoto 1280 | PowerShot A5 | DC210 | PhotoPC 700 |
| Mouse rating | ♦♦½ | ♦♦♦♦ | ♦♦♦½ | ♦♦♦½ |
| Price (list/company's estimated) | $649/$649 | $699/NA | $699/$699 | $799/$699 |
| Phone | 978/658-5600 | 757/413-2848 | 716/724-4000 | 310/782-0770 |
| Web address | www.agfahome.com | www.ccsi.canon.com | www.kodak.com | www.epson.com |
| Dimensions (w x h x d, in inches) | 6.1 x 2.0 x 3.8 | 4.0 x 2.7 x 1.3 | 5.2 x 3.2 x 1.9 | 5.7 x 2.8 x 1.9 |
| Weight (with batteries, in ounces) | 17 | 11 | 15 | 13 |
| CCD resolution (in pixels) | 810,000 | 810,000 | 1,010,520 | 1,250,000 |
| Maximum image size (in pixels) | 1,280 x 960[A] | 1,024 x 768 | 1,152 x 864 | 1,280 x 960 |
| Default memory | 4MB | 8MB | 4MB | 4MB[B] |
| Expandable-media format | SmartMedia 3.3V | CompactFlash | CompactFlash | CompactFlash |
| Storage capacity (in images) at maximum image size[C] | 6 | 8 to 89 | 13 to 30 | 5 to 11 |
| Focus mechanism | auto | auto | fixed | auto |
| Closest focal distance (in inches) | 4 | 3 | 8 | 4 |
| Optical-zoom function | ● (3x) | ○ | ● (2x) | ○ |
| Built-in flash/red-eye compensation | ●/● | ●/● | ●/● | ●/○ |
| LCD preview/playback | ●/● | ●/● | ●/● | ●/● |
| Optical viewfinder | ○ | ● | ● | ● |
| Photoshop acquire module | ● | ● | ● | ○ |
| Rechargeable batteries with charger | ● | ● | ○ | ● |
| Macintosh connectivity | serial | serial | $24.95 extra | serial |
| Small-format printed documentation | ○[D] | ● | ● | ● |

● = yes; ○ = no; NA = not available. [A] Requires software interpolation. [B] Default memory on board; expandable media optional [C] Varies according to compression [D] Batteries charge inside camera.

and the $699 D-500L from Olympus, all of which have a CCD resolution of around 810,000 pixels. That's still about 200,000 pixels shy of the official megapixel mark, but it levels the playing field so that we can judge all these cameras independently of the maddening hype.

The moral of the story is to check the CCD's resolution before buying a camera. For example, Agfa claims a maximum image resolution of 1,024 by 768 pixels for its $399 ePhoto 780. But with a mere 350,000-pixel CCD, it has to invent the remaining 440,000 pixels—more than it captures—by using software interpolation. Needless to say, the images shot with the ePhoto 780 compare badly to those captured with cameras having higher-resolution CCDs.

## FOCUS, FLASH, AND FRAME

Beyond the CCD, the items of most interest to discerning camera buyers are focus, flash, and frame.

**Subject Sharp, Background Soft** Kodak's DC210 relies on a fixed-focus lens. This ensures that you never focus on the wrong object, but it also makes for flat compositions, with foreground and background focused the same.

Just a few months ago, fixed focus was the norm, and we awarded the DC210 ♦♦♦♦½ for its superior picture quality (see "Midrange Digital Cameras," *Reviews*, April 1998). But the digital-camera industry moves fast—now every camera in our survey but the DC210 has upgraded to autofocus, complete with the ability to lock in on an object by pressing the shutter release halfway. As a result, the DC210 has slipped to ♦♦♦½. You can't stand still for five seconds in this industry.

Of the new autofocusers, the Olympus D-500L and D-600L have the most sensitive mechanism. Their unique single-lens–reflex (SLR) design lets you confirm the focus of your shot by looking through the optical viewfinder. But if either camera has the slightest problem finding the proper focus—especially in low light—it refuses to snap the picture. You can override the autofocus by selecting between two fixed-focus settings, but I, for one, would dearly appreciate the control of a manual focusing ring, a feature provided by none of the ten cameras we tested.

**Dime-Store Strobes** Every one of the ten cameras offers a built-in flash, they all let you force the flash in backlit situations, and all but the Epson PhotoPC 700 and the Polaroid PDC-3000 provide red-eye compensation. However, most of the flashes are flush-mounted on the camera housing, making it easy to cover them with your fingers. The exceptions are the

| Nikon | Olympus America | Olympus America | Olympus America | EDITORS' CHOICE OFFICE CAMERA Olympus America | Polaroid |
|---|---|---|---|---|---|
| CoolPix 900 | D-320L | D-340L | D-500L | D-600L | PDC-3000 |
| ♦♦♦♦ | ♦♦♦ | ♦♦♦½ | ♦♦♦♦ | ♦♦♦♦½ | ♦♦½ |
| NA/$899 | NA/$499 | $799 | NA/$699 | NA/$999 | $2,495/$2,200 |
| 516/547-4355 | 516/844-5000 | 516/844-5000 | 516/844-5000 | 516/844-5000 | 781/386-2000 |
| www.nikonusa.com | www.olympus.com | www.olympus.com | www.olympus.com | www.olympus.com | www.polaroid.com |
| 6.2 x 3.0 x 1.4 | 5.0 x 2.6 x 1.8 | 5.0 x 2.6 x 1.8 | 4.5 x 3.3 x 5.1 | 4.5 x 3.3 x 5.1 | 7.9 x 2.2 x 6.3 |
| 17 | 12 | 12 | 21 | 21 | 32 |
| 1,340,000 | 810,000 | 1,310,000 | 850,000 | 1,410,000 | 980,000 |
| 1,280 x 960 | 1,024 x 768 | 1,280 x 960 | 1,024 x 768 | 1,280 x 1,024 | 1,600 x 1,200[a] |
| 4MB | 2MB | 4MB | 2MB | 4MB | 20MB |
| CompactFlash | SmartMedia 3.3V | SmartMedia 3.3V | SmartMedia 3.3V | SmartMedia 3.3V | CompactFlash |
| 6 to 24 | 10 | 9 to 18 | 3 to 10 | 4 to 12 | 20 to 190 |
| auto | auto | auto | auto and fixed | auto and fixed | auto |
| 3 | 8 | 4 | 12 | 12 | 10 |
| ● (3x) | | | ● (3x) | ● (3x) | |
| ●/● | ●/● | ●/● | ●/● | ●/● | ●/ |
| ●/● | ●/● | ●/● | /● | /● | / |
| ● | ● | ● | ● (SLR) | ● (SLR) | ● |
| | ● | ● | ● | ● | ● |
| | | | | | ●[b] |
| serial | serial | serial | serial | serial | SCSI |
| abridged[a] | ● | ● | ● | ● | [a] |

[a] *Full documentation supplied as electronic PDF file.*





ePhoto 1280 and the PDC-3000, on which the flash extends to the side, and the D-500L and the D-600L, which provide a retractable flash on a hinge. We discovered that only two of the cameras—the ePhoto 1280 and Nikon's CoolPix 900—can automatically sync with freestanding lights in a professional studio. With the others, your only option is to use the built-in flash, which typically results in overly harsh contrast in interior and nighttime shots. Discerning photographers will want to forgo the flash and use these cameras only in full light.

**Going In for the Shot** Five of the cameras—the CoolPix 900, D-500L, D-600L, DC210, and ePhoto 1280—offer a continuous-optical-zoom function, great for framing your shot just right. The D-500L and the D-600L do the best job, with a 3× motor-driven zoom whose trigger is up top, where you can reach it most easily.

Beware of claims for "digital" zoom—like that provided by the Epson PhotoPC 700 and the Olympus D-340L—which is really smoke and mirrors. When you "zoom" in, these cameras crop away all but the center of the image and enlarge it, using software interpolation. The result is gummy and unfocused, quite the opposite of the pinpoint clarity a true optical zoom provides.

**See What the Camera Sees** The other great framing tool is an SLR lens. When you look through the viewfinder of the D-500L or the D-600L, you see the exact image the camera sees. Other cameras do let you gauge the composition on an LCD screen, but unfortunately these live LCD previews drain batteries faster than you can say, "There goes another box of AA's into the landfill!" Only the PDC-3000 lacks both an SLR and an LCD viewfinder, instead relying exclusively on a barrel sight that makes lining up a shot every bit as tricky as peeking through a keyhole.

## USING THE DARNED THING

The biggest frustrations you'll typically encounter when using a digital camera are running out of storage space and running out of power.

**Maximizing the Memory** Luckily, storage space isn't much of a concern with this bunch. Each of these cameras is expandable, relying on either a CompactFlash or a SmartMedia card, both widely accepted standards. The most generous cameras are the PDC-3000, which includes a 20MB card, and the PowerShot A5, which includes 8MB. But if you find yourself running out of room with one of the other cameras, you can always buy an extra 8MB card, for about $90. The PhotoPC 700 is the only camera with on-board memory. This means the CompactFlash slot is open, so you can expand the storage without swapping cards.

**Batteries That Work** Power is a more precious resource. Of the ten cameras, six ship with disposable AA cells and advise you to buy rechargeable NiCds. Shame on Kodak, Nikon, and Olympus for putting the burden on the user.

Macworld LAB TEST

# Seeing Is Believing

Our jury of experts rated Nikon's CoolPix 900 and Olympus's D-600L tops in terms of image quality. The SCSI-based Polaroid PDC-3000 was our download-speed champ, while the Canon PowerShot A5 fared best at shooting several pictures in quick succession.

**Best overall performance. Editors' Choice winners' names in red. For image-quality scores, higher numbers and longer bars are better. Speed tests are represented in seconds, so lower scores are better.**

| | SUBJECTIVE IMAGE QUALITY | | | | | SPEED | |
|---|---|---|---|---|---|---|---|
| | Color Fidelity | Color Saturation | Contrast | Sharpness | General Usefulness | Download Time (in seconds)* | Time between Pictures (in seconds) |
| Agfa ePhoto 1280 | 2.0 | 3.0 | 4.0 | 4.0 | 3.0 | 65.9 | 16.7 |
| Canon PowerShot A5 | 3.0 | 3.0 | 2.5 | 3.0 | 3.0 | 38.6 | **5.1** |
| Epson PhotoPC 700 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 29.7 | 6.1 |
| Kodak DC210 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 40.1 | 9.8 |
| Nikon CoolPix 900 | 4.0 | 4.0 | 5.0 | 5.0 | 4.0 | 98.0 | 6.3 |
| Olympus D-320L | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | 14.9 | 13.7 |
| Olympus D-340L** | NA | NA | NA | NA | NA | 31.1 | 7.1 |
| Olympus D-500L | 3.0 | 3.0 | 4.0 | 4.0 | 3.0 | 34.5 | 7.2 |
| Olympus D-600L | 3.0 | 4.5 | 5.0 | 5.0 | 4.0 | 47.7 | 11.2 |
| Polaroid PDC-3000 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | **4.8** | 9.9 |

*NA = not available. *Serial cameras tested on printer port. **This camera arrived too late to be included in our jury tests.*

### Behind Our Tests

The Image Quality scores were produced by a jury of six graphics experts, who reviewed photographs from each camera printed on a Kodak Desktop Color Proofer 9000. Test images consisted of a series of indoor and outdoor photographs taken with and without flash. Jurors were asked to rate the photos on a scale from 1 to 7, where 7 referred to reference photos taken with Kodak's $14,999 DCS 520 professional digital camera and printed to the same proofer. Scores represented are the median scores from the entire jury. Download time represents how long it takes to download one image captured at each camera's highest resolution. Downloads were performed on a Power Macintosh 7300/200. The time between pictures is how long each camera pauses before it is ready to take another picture.—**Macworld Lab testing supervised by Gil Loyola**

# You Be The Judge

EVALUATING A PHOTOGRAPH IS LIKE ADMIRING A PIECE OF ART. WE MAY agree on most points, but ultimately it's a subjective call. Macworld Lab conducted a series of subjective tests and decided that the Nikon CoolPix 900 ranked first in image quality and the Olympus D-320L ranked last. But the opinion that really matters is yours. To help you arrive at your own decision, I photographed this still life in outdoor light with a forced flash to fill in the shadows. Because each camera's lens is positioned differently on a tripod's housing, I swiveled the cameras in an attempt to get a consistent composition, but the tripod feet never moved.

I shot all pictures at the cameras' highest resolution and lowest compression settings. Then I selected the best shot from each camera and corrected the brightness and sharpness in Adobe Photoshop. The corrections are merely a finesse—you can't invent clarity or color when none was captured—so these final images accurately represent the ten cameras at their best.



**Agfa ePhoto 1280** This camera captures 810,000 pixels and inflates the image size using software. The result is soft focus in the wine and cheese labels. Also note the blown highlights in the cherries and knife.



**Canon PowerShot A5** The focus in the PowerShot A5 picture is soft, as if the camera moved slightly during the shot. But the color is good, with a few blown highlights on the knife and the far side of the creek.



**Eastman Kodak DC210** The color in this image is great, with no blown highlights. But the clarity is only marginally better than in the PhotoPC 700's shot, with muddy edges around the wineglass and grapes.



**Epson PhotoPC 700** This camera's image ranks last overall among those of the true megapixel cameras. If you look closely, you may spot jagged edges along the knife blade and cheese labels.



**Nikon CoolPix 900** This is the image that makes you whistle. The front cracker is a little hot, but otherwise the photo's rendition is perfect: excellent color, continuous lighting, and great edges.



**Olympus D-320L** The D-320L has been on the market longer than any of the other cameras we looked at, and it shows. This image's soft focus, ragged edges, and blown highlights are the reasons it scored poorly.



**Olympus D-340L** The D-340L looks and works virtually identically to the D-320L, but its pictures are a world better. It captures colors as accurately as Nikon's CoolPix 900, but the focus is slightly softer.



**Olympus D-500L** This image measures the same 1,024 by 768 pixels as the one from the D-320L, but it looks better, thanks to an updated CCD and improved lenses. The color is oversaturated.



**Olympus D-600L** Olympus should trademark its heightened saturation. But there are no blown highlights. And check out that depth of field, with soft plants in the background and sharp cherries up front.



**Polaroid PDC-3000** This camera received low marks from our jury because the test images didn't look great when viewed raw. But these images polished up beautifully. The lighting is intimate, and the color is flawless.





The Agfa and Epson models ship with NiCds and a charger. Agfa's charger is as big as the camera, but Epson provides a handheld unit that plugs in without a cable. Polaroid lets you charge batteries inside the camera, so you never have to put them in or take them out. But my favorite solution comes from Canon. You have just one battery for easy loading and unloading, the battery locks into place for safekeeping, and it lasts a long time between charges from the included external charger. I routinely snapped hundreds of pictures off one battery, even when using the LCD, compared with 30 or 40 pictures from the competition.

**From Camera to Computer** When it comes time to transfer the pictures to your computer, the PDC-3000 is the fastest. Thanks to its SCSI connection, it takes less than five seconds to download an image. By comparison, the slowest camera, the ePhoto 1280, takes more than ten times that long.

The fastest camera that relies on a serial connection is the Nikon CoolPix 900. As with the original Apple QuickTake, you use a control panel to mount the camera as a desktop icon. Then you open it like a disk and drag-copy the images to your hard disk at about eight seconds a pop. But there's a catch—you have to use your Mac's modem port. Macworld Lab discovered that if you use the printer port instead, files may take ten times as long to download.

If you purchase a D-320L before the end of 1998, Olympus will send you a free FlashPath adapter (normally $99), which lets you stick the SmartMedia card into a PC's floppy drive and drag-copy files in a few seconds apiece. I tested the FlashPath adapter with all the SmartMedia-based cameras on my PC, and it worked great. For the time being, the FlashPath works exclusively with Windows 3.1 and 95 (see "A Bump in the FlashPath," *News*, in this issue).

## MACWORLD'S BUYING ADVICE

The best camera in this class is undoubtedly the Olympus D-600L. Although it's one of the most expensive cameras on our list—with the company's estimated price just a buck shy of $1,000—its SLR design, exceptional focus and flash, 3× zoom function, and large CCD make it a solid office camera. Add in its exceptional picture quality—ranking second in Macworld Lab's subjective tests—and you have a real performer. In fact, my only gripe is its lack of rechargeable batteries. You can pick up AA NiCds and a charger on your own for about $40; you just shouldn't have to.

Finishing a close second is the $899 Nikon CoolPix 900, the first-place finisher in our juried subjective tests. Although it could stand a better optical viewfinder and more-extensive printed documentation, its picture quality and download software are nothing short of excellent.

My favorite camera to *use* was the reasonably priced ($699) Canon PowerShot A5. Measuring 4 by 3 inches, this camera is smaller than the images it captures. Toss it in the glove compartment, and you're ready for any client emergency, even when you're out on the road and you've left the rest of your bulky equipment back at the office. And with an 8MB card and a rechargeable battery, you can take pictures till the cows come home. The PowerShot even has a panorama function that helps you align multiple shots and stitch them together. The picture quality is hardly outstanding, but unless you're comparing the cameras side by side the way we did, you'll find little to complain about. This is a convenient and compact personal camera you'll get your money out of, and in the transient world of electronic imaging, that counts for a lot.

The big disappointments are Agfa's ePhoto 1280 and Polaroid's PDC-3000. In addition to a series of software problems (documented in "Optical-Zoom Digital Cameras," *Reviews*, August 1998), the ePhoto 1280 tends to cease functioning after it's been connected to a computer. You have to clean out the camera's tiny minijack—I used a tissue and some head cleaner—to get it to work again.

The PDC-3000 takes great pictures, but it lacks an LCD viewfinder, it lets you take pictures when the lens cap is on, it doesn't let you save images in the JPEG format, and it costs more than twice as much as the more capable D-600L. Polaroid's camera is an example of what can happen if you fail to upgrade your hardware in a volatile environment. Two years ago, the ♦♦♦♦ PDC-2000 was the best thing on the market; now the barely changed ♦♦½ PDC-3000 is a sluggish dinosaur.

That's bad news for Polaroid but good news for you and me. In the past, I recommended digital cameras only to professionals who cared more about superfast turnaround than about quality or cost. Nowadays, the megapixel cameras are still expensive—similarly equipped film cameras can be had for half the price or less—but you no longer have to accept 640-by-480-pixel images that look like the fuzzy work of an impressionistic painter.

Granted, as is the case with much of your digital equipment, if you take the plunge today, you know that something else better will be here tomorrow. The difference is that two years from now, a typical designer who bought one of these cameras not only will have made some money from the investment but will also still be able to find some use for the device. It's finally time to start looking at digital cameras as an essential element of your studio. **m**

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Contributing Editor DEKE McCLELLAND is the author of the *Photoshop Studio Secrets* book series (IDG Books Worldwide), winner of a 1997 Computer Press Award.

## EDITORS' CHOICE

**Office Camera**

♦♦♦♦½ **Olympus D-600L** The best megapixel digital camera costs less than $1,000 and boasts an SLR viewfinder, terrific autofocus, a 3× optical zoom, and a 1.4-million-pixel CCD. **Company:** Olympus America (516/844-5000, www.olympus.com). **Company's estimated price:** $999.

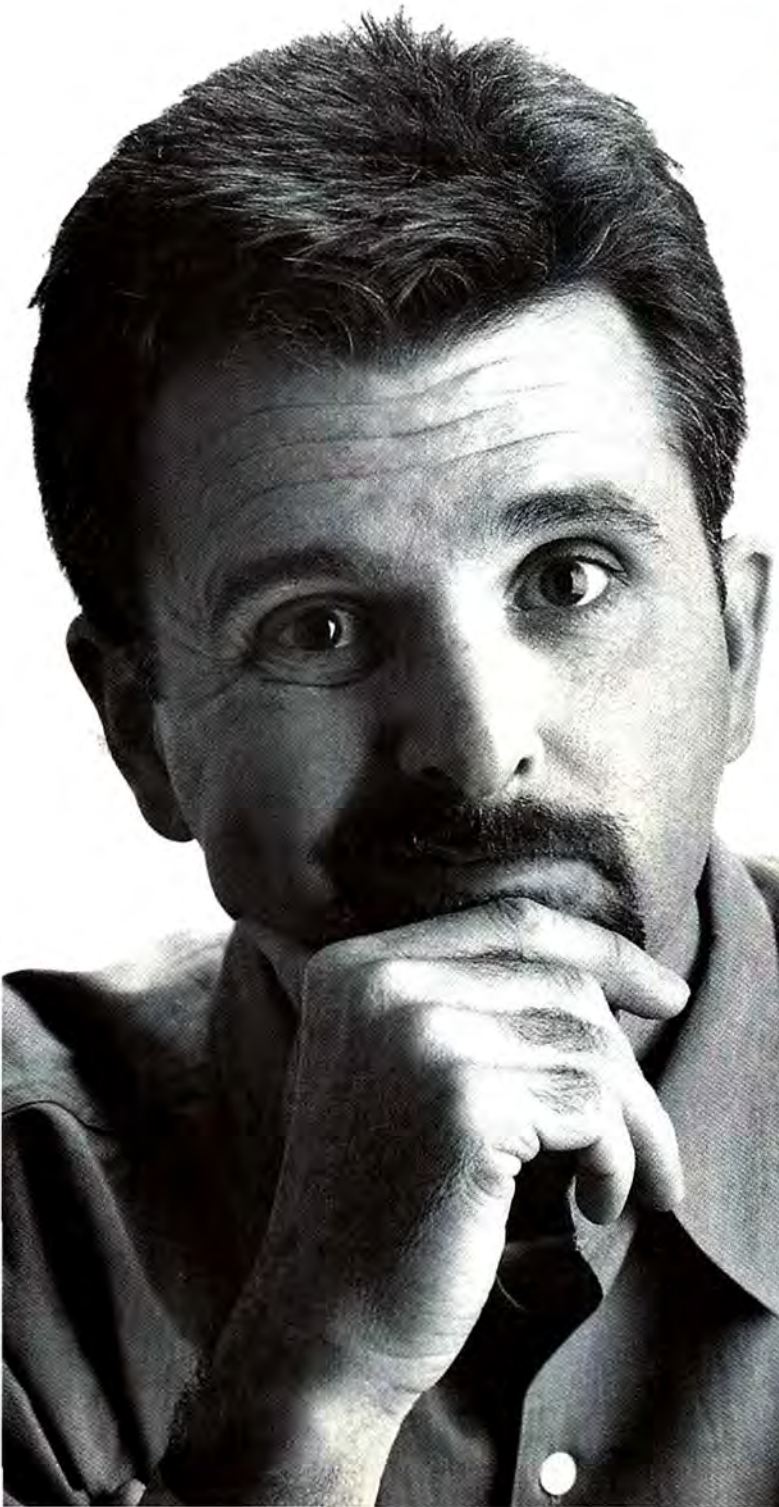
**Personal Camera**

♦♦♦♦ **Canon PowerShot A5** Compact design, generous storage, and a long-life rechargeable battery make this model perfect for weekend and personal use. **Company:** Canon (757/413-2848, www.ccsi.canon.com). **Company's estimated price:** $699.

REAL PRODUCTS REAL RATINGS

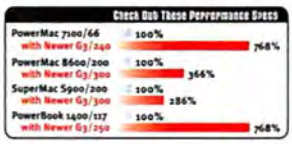
**Reviews you can trust** *Macworld* rates only final shipping products, not prototypes. What we review is what you can actually buy.

# "I'm sick of having to settle for a slower Mac just because my budget sucks."



## Sometimes Newer Is Smarter Than New.

In a perfect world, we all would buy a new, top-of-the-line Mac right now. Of course, there's that little thing called money, the stuff most of us don't have coming out of our ears. That's why you need a Newer Technology MAXpowr G3 processor upgrade card. They're easy to install and save you thousands of dollars compared to buying a whole new system.




Newer Technology makes processor upgrade cards for almost every Power Mac and are adding more machines to the list with faster processor speeds as you read this. With a MAXpowr G3 card, you'll have a faster processor with a much faster cache. In fact, the MAXpowr G3 card can make your old Mac one of the fastest desktop computers available even compared to Apple's new screaming G3 machines. Thanks to Newer Technology, your older, slower Power Mac has new life which makes waiting for a brand new machine a lot less painful.

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# PRINT OUT

## MAKE YOUR IMAGES COME ALIVE WITH THESE SEVEN HIGH-QUALITY COLOR PRINTERS



BY SUZANNE COURTEAU

Macworld LAB TEST

You've spent hours in Adobe Photoshop transforming scanned color images and digital-camera photos into masterpieces. Now comes the hard part: how are you going to print?

When you want to print in color—whether it's to create photos for hanging above the mantel or to get rough layout proofs—you face a wide range of options *and* questions. Should you pony up thousands of dollars for a dye-sublimation printer or go for an inexpensive photo-quality ink-jet model? Are different printers better suited to different tasks?

To get the answers, Macworld Lab tested seven color printers aimed at artists and photographers, from serious home enthusiasts to graphics professionals. Five sell for less than $800, while the other two will set you back nearly $10,000 each. We wanted to see how much print quality—if any—you give up when you opt for a less expensive technology. We were especially interested in photographic output—one area where costly dye-sublimation printers have long held an advantage over traditionally low-end ink-jets.

Our investigation made one thing clear: times have changed. Dye-sublimation printers still produce great-looking photos, but in some cases, we found that the best image came from the least-expensive printer in the group.

### THE CONTESTANTS

Four printers in our roundup are ink-jet models from Epson America (www.epson.com): the $379 Epson Stylus Color 850, $799 Epson Stylus Color 1520, $279 Epson Stylus Photo 700, and $499 Epson Stylus Photo EX. That's it when it comes to low-cost Mac ink-jet printers; Apple has pulled out of the ink-jet business, and Hewlett-Packard's latest Mac printers were not available in time to be evaluated for this article.

Along with Epson's ink-jet offerings, we looked at the $599 Alps MD-1300 Photographic-Quality Color Printer, a dye-sublimation unit from Alps Electric (www.alpsusa.com), and at the high end of the price scale, the $7,995 Kodak Professional 8670 PS Thermal Printer (www.kodak.com) and the $7,995 Tektronix Phaser 380 solid-ink printer (www.tektronix.com). The extra networking options *required* in order to run these two printers on a Mac add at least $650 and $495, respectively, to their cost. We tested the Tektronix printer with a higher-end networking option that added $2,000 to its cost.

### THE TWO TECHNOLOGIES

Dye-sublimation printers, although expensive, have long set the standard for photo-quality output. These printers use a thermal element to vaporize dye from a print ribbon. The gaseous dye hits the paper in various levels of dye intensity—a single dot may, for example, consist of 10 percent cyan, 30 percent magenta, and 25 percent yellow dye.

Most ink-jet printers cannot vary color intensity in this manner; each dot is 100 percent of either cyan, magenta, yellow, or black. As a result, dye-sublimation printers have generally come much closer to reproducing the smooth continuous tones you see in traditional photographs.

Dye-sub printers have their problems, though. Most don't





print in true black, instead combining cyan, magenta, and yellow to make a muddy composite black unsuitable for producing crisp text. The Kodak Professional 8670 PS lets you choose from CMY and CMYK ribbons. (In printer-speak, *CMY* stands for cyan, magenta, and yellow; *K* stands for black.) At 300-dpi resolution, however, the Kodak's text still lacks sharpness.

**Alps's Innovative Hybrid** The Alps MD-1300—which is priced to compete with ink-jet printers—combines dye sublimation with the company's proprietary Micro Dry thermal-transfer technology. The printer uses narrow ribbons housed in four small cartridges. You can choose to use CMYK photographic ink ribbons and media to print in dye-sublimation mode or dry-resin ribbons to print in thermal-transfer mode. In addition to CMYK, Micro Dry ribbons are available in metallic colors and white, both of which are useful for printing on dark paper.

**The Ink-Jet Revolution** Inexpensive ink-jet printers have traditionally been relegated to home printing. These printers compensate for their inability to print continuous tones by arranging dots in such a way that the dots *appear* to blend together. The problem was that early printers weren't very good at hiding the dot patterns, which meant that every one of your images got the Roy Lichtenstein treatment, like it or not.

All that's in the past now. Higher resolution, sophisticated dot-placement software, and other tricks make the dots barely noticeable in the output of the new ink-jets. These printers are now also much better than dye-sublimation printers at producing text. The six-color Epson Stylus Photo printers employ a particularly nice trick to simulate continuous tones—they add two additional inks to the mix, printing in a light cyan and light magenta as well as standard CMYK.

**Tektronix's Weighty Option** Although it's also an ink-jet printer, the Tektronix Phaser 380 bears little resemblance to the Epson models. It's massive, weighing in at 220 pounds. It also uses solid blocks of CMYK-colored wax rather than the liquid inks in other printers. These differences reflect the printers' different purposes. Tektronix markets the Phaser 380 not as a photo printer but as a device primarily for producing rough proofs and comprehensives (comps) for client approval of design projects.

## IS POSTSCRIPT A MUST?

To keep costs down, the less expensive ink-jet printers in our roundup rely on QuickDraw, the imaging software built into the Mac, rather than Adobe's PostScript to build a page before it's printed. PostScript is the universal language of professional graphics production, so what are you giving up when you print with QuickDraw?

QuickDraw printers generally do a good job of printing text and photographic images. However, when you print from an illustration program such as Adobe Illustrator or Macromedia FreeHand, you'll find that PostScript printers produce smoother blends. You also need PostScript if you want to print jaggie-free EPS files from QuarkXPress or Adobe PageMaker.

**Hardware versus Software** Two printers in our roundup—the Tektronix Phaser 380 and Kodak Professional 8670 PS—include built-in PostScript controllers and thus provide the strongest support for Adobe's page-description language. The Kodak Professional 8670 PS uses PostScript 3, the latest version, while the Tektronix Phaser 380 uses PostScript Level 2.

The other printers, except the Epson Stylus Photo 700, offer PostScript as a software option—a raster image processor (RIP) that runs on your Macintosh. Printing with software RIPs is typically much slower than using printers with built-in RIPs, which have specialized chips to speed print processing. Alps sells a PostScript 3 software option for $199. Epson's PostScript Level 2 add-on sells for $99.

## QUALITY IS KEY

When graphic artists evaluate print quality, they look at such factors as sharpness, color fidelity, color saturation, and shadow and highlight detail. To see how the output of these printers compared, we assembled a panel of graphics professionals to evaluate samples on a scale of 1 to 7, with 7 indicating that the quality of the output sample matched that of our original reference image. (See the sidebar, "The Color You Expect," to check out some of these images for yourself.)

The jury examined a set of test files produced on each printer from Photoshop, Illustrator, and PageMaker. We

## COLOR PRINTERS: EXPECT INEXPENSIVE EXCELLENCE

| Company | Product | Mouse Rating | Company's Estimated Price | Phone | Print Technology | Maximum Resolution (in dpi) |
|---|---|---|---|---|---|---|
| Alps Electric | Alps MD-1300 Photographic-Quality Color Printer | ♦♦♦½ | $599 | 408/432-6000 | dye-sublimation, Micro Dry ink | 1,200 x 600 |
| Eastman Kodak | Kodak Professional 8670 PS Thermal Printer | ♦♦♦½ | $8,645 ** | 716/724-4000 | dye-sublimation | 300 x 300 |
| Epson America | Epson Stylus Color 850 | ♦♦♦♦ | $379 | 310/782-0770 | liquid ink-jet | 1,440 x 720 |
| | Epson Stylus Color 1520 | ♦♦♦½ | $799 | 310/782-0770 | liquid ink-jet | 1,440 x 720 |
| | EDITORS' CHOICE<br>Epson Stylus Photo 700 | ♦♦♦♦½ | $279 | 310/782-0770 | liquid ink-jet | 1,440 x 720 |
| | Epson Stylus Photo EX | ♦♦♦½ | $499 | 310/782-0770 | liquid ink-jet | 1,440 x 720 |
| Tektronix | Tektronix Phaser 380 | ♦♦½ | $9,995 *** | 503/682-7377 | solid ink | 600 x 300 |

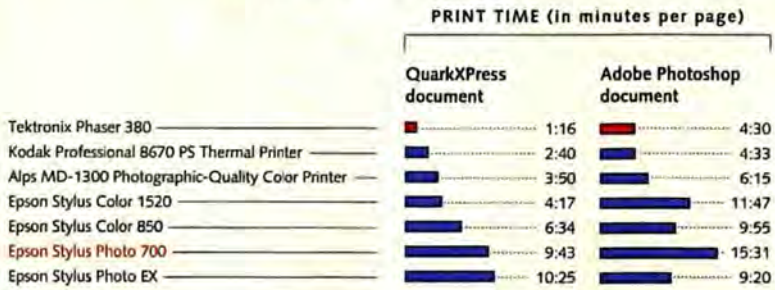
* Number of inks that can print at any one time. ** Includes $650 Mac-compatible networking option. *** Includes the $2,000 Extended Features option. Also available for $8,490 total with basic Mac-compatible

## Instant Prints?

Macworld LAB TEST

Whatever kind of artwork you're printing, it's nice not to have to wait forever to see your image appear on the page. Sadly, price and performance are directly related when it comes to print time. The fastest printers in our roundup were the $9,995 Tektronix Phaser 380 and the $8,645 Kodak Professional 8670 PS. The $279 Epson Stylus Photo 700 offers excellent image quality but is slow.

**Best overall performance. Editors' Choice winner's name in red. Times are in minutes:seconds. Shorter bars are better.**




**Behind Our Tests** Each printer ran two passes of a seven-page QuarkXPress document and a single-page Adobe Photoshop document (without background printing enabled). Times were recorded from the pressing of the Print button until the page hit the output tray. For the multipage QuarkXPress document, times were recorded for both the first and last pages and then averaged.—**Macworld Lab testing supervised by Nancy Canning**

printed on the highest-quality paper supported by each printer, using settings recommended by the printer's manufacturer for maximum quality. With the Epson printers, this meant printing images in RGB mode rather than the customary CMYK. We chose not to use third-party color-management software to create custom profiles.

**The Best and the Worst** We found the biggest quality contrast between the two most expensive printers in the roundup, the Kodak Professional 8670 PS and the Tektronix Phaser 380. Our experts gave the highest quality ratings to the Kodak printer and some of the lowest to the Tektronix.

The Kodak Professional 8670 PS produced the smoothest continuous-tone images. It lost some detail in shadow areas, but not enough to bother our experts. Thanks in part to its use of PostScript 3, the printer produced our Illustrator file without the banding that appeared in the samples of some other printers. Kodak's color-management software also simplifies the process of producing accurate colors.

In contrast, the Tektronix Phaser 380 earned consistently low scores for image quality. The photos printed with noticeable dot patterns as well as a strong magenta cast. The Phaser 380 does have some notable strengths as a comping device—it's fast, it prints tabloid-size output, and its consumables are relatively inexpensive. But if you want comps with good-looking photos, you'll be disappointed.

**Inexpensive Excellence** To our surprise, the less costly printers stacked up well against their pricier cousins. Our experts were most impressed with the Epson Stylus Photo 700 and its wide-format sibling, the Epson Stylus Photo EX; they produced nearly identical output samples. These six-color printers proved especially adept at reproducing flesh tones and shadow detail. At 1,440 by 720 dpi, the printers also produced crisp text and fine lines. However, due to their lack of built-in PostScript support, both displayed banding in gradient fills when printing from Illustrator.

The Alps MD-1300 also earned high marks for photographic reproduction. Alps has improved its Micro Dry technology since introducing the MD-1000 in 1997. Thanks to the

| Maximum Print Size (in inches) | Number of Colors* | Consumables | Options |
|---|---|---|---|
| 8.5 x 11 | 4 | photo ink cartridges, $12 each; Micro Dry cartridges, $7 each; metallic and white ink cartridges, $10 each | PostScript 3 software, $199 |
| 9.5 x 14 | 4 | CMYK ribbon, $200 each | Requires network option (10/100BaseT Ethernet card) for use with a Mac (cost included). |
| 8.5 x 11 | 4 | black cartridge, $25.53; 3-color cartridge, $25.53 | Add $150 for networking. |
| 17 x 22 | 4 | black cartridge, $25.53; 3-color cartridge, $25.53 | PostScript Level 2 software, $99; add $149 for LocalTalk adapter, $329 for Ethernet. |
| 8.5 x 44 | 6 | black cartridge, $21.21; 5-color cartridge, $16.95 | Has no networking or PostScript options. |
| 11 x 44 | 6 | black cartridge, $21.21; 5-color cartridge, $16.95 | PostScript Level 2 software, $99. |
| 13 x 18.5 | 4 | 2-pack black, $69; 2-pack cyan, $89; 2-pack magenta, $89; 2-pack yellow, $89; Rainbow pack (1 stick of each), $168 | Requires network option for use with Mac. Extended Features option includes 10BaseT Ethernet, 48MB of RAM, and 600-by-300-dpi resolution (cost included). |

*networking capabilities.*

# THE COLOR YOU EXPECT

IMAGE QUALITY IS KING, SO TO GET A FEEL FOR just what our seven color printers could do, Macworld Lab and an expert jury examined many images printed by each.

As you can see here, Kodak's $8,645 Professional 8670 PS dye-sublimation printer provided the smoothest continuous tones. The big surprise, however, was that for drastically less money Epson's $279 Stylus Photo 700 and $499 Stylus Photo EX also gave excellent results.



**Original Image** For the purposes of comparison, here's our test file, without the steps of printing and rescanning.



**Alps MD-1300** Alps Electric's variation on dye-sublimation technology pays off with great continuous-tone prints. Edges are crisp, and nary a dot pattern can be seen.



**Epson Stylus Color 850** This business printer, like the Stylus Color 1520, lacks the six-color output of Epson's Stylus Photo printers, but it still produces good-looking images. Dot patterns are well hidden, and you also get great text output.



**Epson Stylus Color 1520** The image is a little dark, but in general, this large-format inkjet printer produced good-looking photos and accurately reproduced Pantone spot colors. You have to look closely to see any dot patterns.



**Epson Stylus Photo 700** The Stylus Photo 700 gives you great photo quality for the money. The colors are lifelike, and flesh tones (not seen here) are realistic. You must look closely to see the dot pattern. Be aware, however, that this printer doesn't have a PostScript option.



**Epson Stylus Photo EX** This large-format sibling to the Epson Stylus Photo 700 produces almost identical high-quality prints of photographic images. There is a PostScript option available for it.



**Kodak Professional 8670 PS** The only conventional dye-sub printer tested, the 8670 PS produced the best continuous tones. This image is a tad dark and some details are obscured, but overall our jurors gave the printer high marks.



**Tektronix Phaser 380** Our jurors were surprised that this image came from a $10,000 printer: it's grainy and oversaturated, with obscured details. The Phaser 380 has its place as a speedy, cost-efficient proofing device, but look elsewhere for photo quality.

printer's black cartridge, printed text is exceedingly crisp.

We noticed a little smearing on some of the MD-1300's output samples, but we didn't find this problem to be consistent or pervasive. We also saw banding problems that were similar to those of the Stylus Photo printers (and that were due to the Alps MD-1300's similar lack of built-in PostScript support).

**Respectable Results** The Epson Stylus Color 850 and Stylus Color 1520 also earned respectable grades from our image-quality experts. Both use essentially the same ink-jet technology found in the Epson Stylus Photo printers but print with four colors instead of six. The wide-format Epson Stylus Color 1520 prints images up to 17 inches wide.

The Epson Stylus Color 850 proved itself a good general-purpose color printer, producing crisp text and nice-looking graphics. It's also *fast*, at least when compared with the Stylus Photo printers. (For comparative printer speeds, see the benchmark, "Instant Prints?")

**On the Spot** In addition to conducting the subjective image-quality tests, Macworld Lab also measured the printers' ability to produce accurate spot colors. We printed out swatches of Pantone colors and then used Xrite's Digital Swatchbook spectrophotometer to see how closely the printed colors matched the original Pantone color values.

The Epson Stylus Color 1520 earned the top score for color accuracy, followed by the two Epson Stylus Photo printers and the Kodak Professional 8670 PS. The Alps and Tektronix printers earned the lowest color-accuracy scores—although we'd still rate both as acceptable. The Stylus Color 850 fell in the middle.

## HOOKING IT UP

What good is a printer if you can't connect it to your Mac? The Epson models include a serial port, for direct connection to your Mac, as well as a parallel port for PCs. The Alps MD-1300 connects to your Mac via the SCSI port.

On the other hand, the Kodak Professional 8670 PS and the Tektronix Phaser 380 both *require* Ethernet adapters if you want to use the printers with your Mac. Kodak's 10/100BaseT Ethernet option adds $650 to the $7,995 list price for a total of $8,645. The Tektronix Phaser 380 is available with either the $2,000 Extended Features package (which includes a 10BaseT Ethernet adapter, extra memory, and 600-by-300-dpi resolution) or with the $495 network adapter only.

If you want the benefits of a fast Ethernet connection with the other printers, the Epson Stylus Color 850 and Stylus Color 1520 do offer Ethernet options; the Alps MD-1300, Epson Stylus Photo 700, and Stylus Photo EX do not.

## BEAUTY'S HIDDEN COSTS

Graphic artists have long known that behind every beautiful print lie several dollar signs. In addition to the initial price of the printer, consider the ongoing cost of consumables.

**Pricey Inks and Papers** Like most other dye-sublimation printers, the Kodak Professional 8670 PS is expensive to operate—each letter-size print costs about $3 in dyes and media. On the other hand, the Tektronix Phaser 380, for all its quality problems, has some of the least-expensive consumables. Its long-lasting wax sticks cost $42 per color when bought in a four-pack. It also doesn't require special (read "expensive") paper like the Kodak does.

Epson's ink-jet printers work with a wide range of paper stocks, but the Stylus Color 850 prints better on plain paper than any of the others. With all four Epson printers, you get the best results—especially when printing photos—on photo gloss paper, which sells for about 50 cents to $1 per sheet.

Epson's ink-jet cartridges range from roughly $17 to $25 apiece. You'll need a black cartridge plus one three- or five-color one, depending on the printer. The cartridges are good for up to 200 pages, but prepare to run out of ink after about 50 pages if you print at high resolution or with lots of ink coverage. These expenses can add up.

The Alps MD-1300 does a fine job of printing text on plain paper, although graphics don't fare quite as well. In addition, our plain-paper prints often suffered from excessive page-curl, especially when pages had heavy ink coverage. For photos and other images, you'll need Alps's premium paper, which costs $22 for a package of 20 sheets, or $1.10 per page.

Alps charges $12 for each photo-quality ink cartridge ($48 for a complete set); cartridges yield 31 prints. For documents with text and simple graphics, you can use standard Micro Dry ink cartridges priced at $7 each. Alps also offers metallic and white ink colors for $10 each.

## MACWORLD'S BUYING ADVICE

For those who are in the market for a color printer and who plan to produce many photographic images, print quality is top priority. Yet since most of us can't afford a $20,000 dye-sublimation printer, cost is also important. At the high end, the $8,645 Kodak Professional 8670 PS Thermal Printer offers highly rated color output, good built-in color matching, and PostScript 3 for smooth EPS output. Its price tag seems hefty but actually compares well with those of other dye-sublimation printers. If you're doing industrial-strength color printing, this is worth a look.

However, in terms of pure image-quality, the less expensive printers in our roundup more than held their own. If price is paramount, you can't go wrong with our pick—the $279 Epson Stylus Photo 700. The Stylus Photo 700 offers stunning photo quality at a price that's almost unbelievable. The almost identical Epson Stylus Photo EX is the best choice if you want to print in a large format or need access to a PostScript option, but at $499 it's not as good a deal. All these printers are dramatic proof that you no longer have to break the bank to get good-looking color images from your Mac. **m**

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Former *Macworld* associate editor SUZANNE COURTEAU is a freelance writer who frequently covers printers.

**EDITORS' CHOICE**

★★★★½ **Epson Stylus Photo 700** This six-color printer produces stunning prints, works well on plain paper, and is among the least-expensive photo-quality printers we've seen. **Company:** Epson America (310/782-0770, www.epson.com). **Company's estimated price:** $279.

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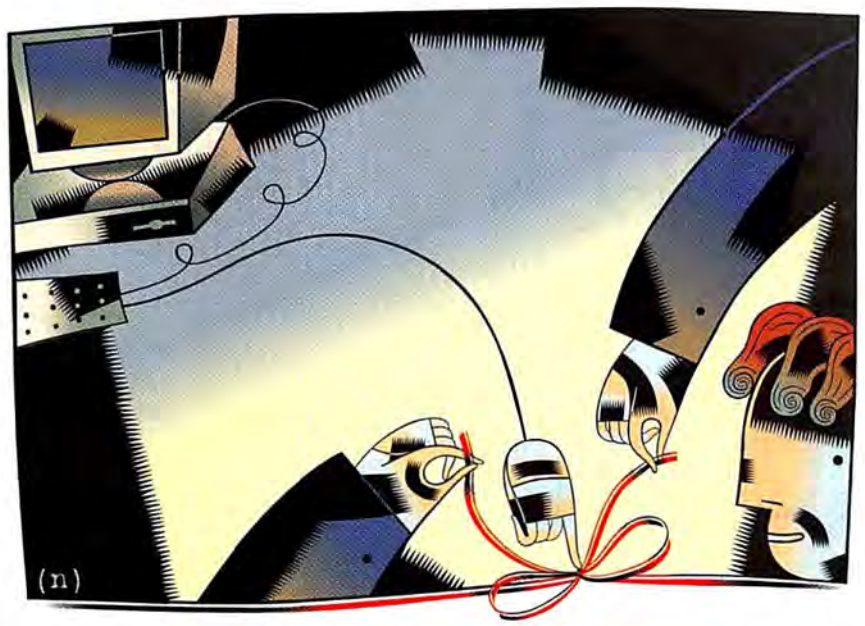
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# Secrets

## Work Less, Do More

SPEED TIPS FOR THE TRULY COMPULSIVE EFFICIENCY FANATIC

by Joseph Schorr



Your new Mac is blisteringly fast, your RAM slots are full, and you've got an absurdly high-capacity hard drive. So why aren't you reaching new heights of speed and efficiency? That depends. Efficiency is about more than sheer megahertz; your new Mac may open a spreadsheet in a lightning-fast 1.2 seconds rather than your old machine's 1.8 seconds, but that alone won't get you home from work any earlier. Sometimes it's the little things *you do* that count—those tiny, repetitive tasks that chip away at your productivity in half-second chunks. Over the course of a week, those half seconds can really add up.

If your 300MHz G3 hasn't catapulted you into the realm of high-powered, pulse-racing computing efficiency, don't upgrade your hardware; upgrade your *working style.* Here are a few tips—none involving any expense or special software—for streamlining those repetitive tasks. Use the time you save to take a nice vacation . . . or maybe even retire early.

### Let Your Mac Start Itself

If you routinely come in to work, hit the power key, and head for Starbucks rather than sitting there watching the extensions load, why not have your Mac turn *itself* on and off every day? Simply open the Energy Saver control panel, click on the Scheduled Startup & Shutdown button, and select a day and time for start-up and shutdown (see "A Real Self-Starter"). To save even more time, take it a step further by dropping aliases of particular programs or documents into the Startup Items folder, in the System Folder, so they launch automatically after start-up.

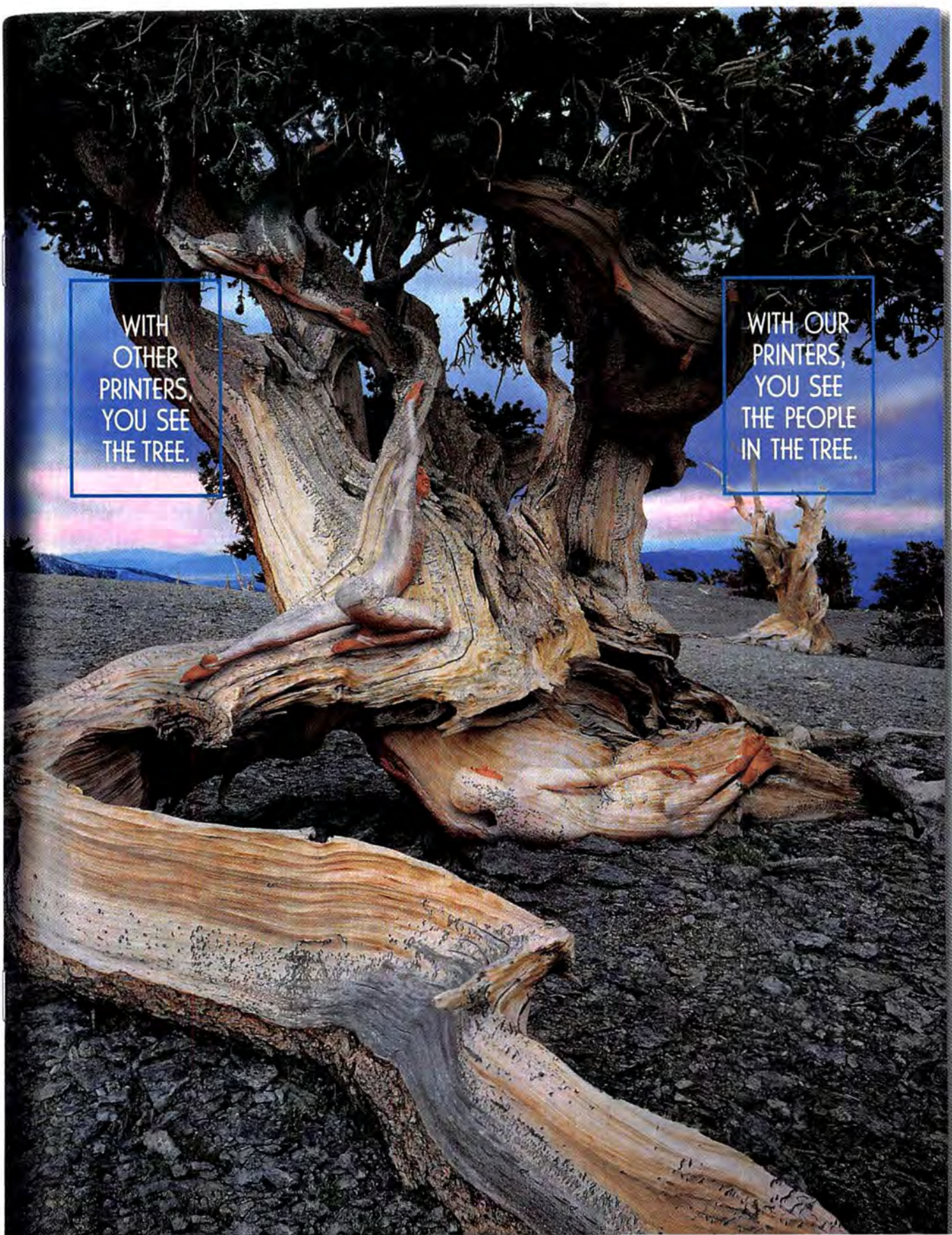
*Time saved per task:* 1.5 minutes
*Frequency of task:* once per workday
*In a year, you save:* 6.5 hours

### Leave the Windows Open

Watch Mac users eject a disk—floppy, Zip, whatever—and you'll notice a pattern. Most users neatly close the *window* of the disk first and then drag its icon into the Trash. But you don't have to close the disk's window; in fact, you don't have to close *any* windows. It's perfectly all right to pop out a disk that has dozens of open windows—it won't hurt the files or the disk. Simply select the disk's icon on the desktop (preferably by typing the first few letters of its name) and then press ⌘-E. (If you're running System 7.6.1 or earlier, use ⌘-Y to avoid leaving a ghosted disk icon on the desktop.) All of the disk's open windows will vanish automatically. When you reinsert the disk, the windows

*continues*

JEFF NEUMANN


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WITH OUR PRINTERS, YOU SEE THE PEOPLE IN THE TREE.

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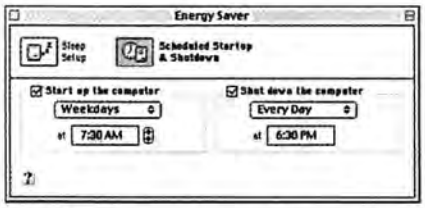

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will reopen automatically—unless you hold down the option key while popping in the disk, in which case all those open windows will instantly close for you.

*Time saved per task:* 3 seconds
*Frequency of task:* 12 times per workday
*In a year, you save:* 2.6 hours

### Drop the Dragging

Drag and drop is a great thing—simple, visual, intuitive. When you're crunched up against a deadline, though, it's best to drop the dragging and keep your fingers flying over the keyboard instead. The classic example is dragging files to the Trash—a quaint, time-honored process. But OS 8's Move To Trash keyboard shortcut (⌘-delete) gets the job done much faster; you can select multiple files and zap them into trashdom with one keystroke. The larger your monitor, the more glorious the time savings.




**A Real Self-Starter** Why waste precious minutes staring at your computer while it plods through its start-up sequence each morning? The Energy Saver control panel lets you set up your Mac so it starts up while you're still hitting the snooze button.

*Time saved per task:* 1.5 seconds
*Frequency of task:* 40 times per workday
*In a year, you save:* 4.3 hours

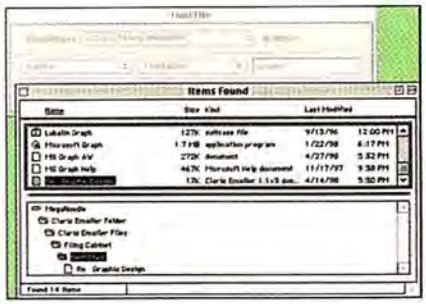
### Find Files Faster

How much time do you spend each day poking around on your hard disk or file servers opening documents, copying files, and launching programs? Think of the time you'd save if all the files you needed were right there on your desktop in plain view—no double-clicking on disk icons or opening nested folders. That's the way it can be if you let Find File do the folder burrowing for you. Press ⌘-F, type a few letters of the file's name, and press return; the file will appear almost instantly in the Items Found window, ready to be opened, copied, or dragged to the Trash (see "Find It Faster").

*Time saved per task:* 6 seconds
*Frequency of task:* 35 times per workday
*In a year, you save:* 15.2 hours

### Timesaving Tweaks

Amazingly, your Mac comes preconfigured with some preferences designed to *slow you down*. In the Finder's Preferences, for example, spring-loaded folders are set to pop open only after a medium-size delay. Who needs that?




**Find It Faster** Once a file or folder turns up in the Items Found window, you can open, copy, or delete it without having to dig around for it.

Drag the Spring-loaded-folders slider all the way to the Short setting, and you'll gain a second or so every time a folder opens.

Menu Blinking is another built-in time waster. Open the General Controls control panel, and use the radio buttons to set Menu Blinking to one blink instead of three. Better yet, just turn it off. You'll really notice a difference, particularly on older, slower Macs.

*Time saved per task:* 0.5 second
*Frequency of task:* 130 times per workday
*In a year, you save:* 4.7 hours. **m**

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JOSEPH SCHORR saved a total of 12.4 hours using the above-mentioned tips while working on the upcoming fifth edition of *Macworld Mac Secrets* (IDG Books Worldwide).

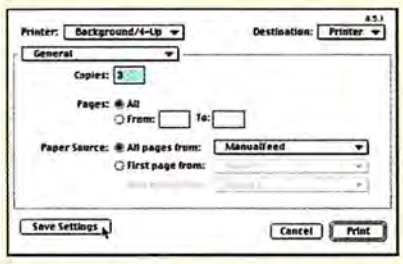
## Pared-Down Printing

WHEN APPLE INTRODUCED THE LASERWriter 8 printer driver a few years ago, printing got easier—and harder. The improved driver offers more options than Apple's older printing software, but those options are spread across nine panels, which you navigate via a pop-up menu. For example, if you want to print a job at a scheduled time, two pages to a sheet, and with a specific ColorSync setting, you'll visit three panels in the dialog box and make repeated trips to the pop-up menu.

One way you can streamline your travels through this morass and save yourself hours over the course of a year is to use keyboard shortcuts. You can avoid the pop-up menu entirely, by using ⌘-down arrow and ⌘-up arrow to navigate the various panels. To access the Background Printing panel from Microsoft Word, for example, simply choose the Print command and press ⌘-down arrow twice.

Once you're in a panel, you can use other shortcuts. In the General panel, use the tab key to move between the Copies and Pages fields; in the Background Printing panel, ⌘-B turns background printing on and ⌘-F turns it off; in the Cover Page panel, pressing ⌘-B adds a cover page before the print job and ⌘-A adds one after the print job.

Potentially the biggest printing timesaver of them all is the Save Settings button, at the bottom left corner of the Print dialog box. If you've changed the print settings in the various panels, click on the Save Settings button to make them the default. Say that you have to print a series of jobs as PostScript files: you can adjust the appropriate settings once in the Save As File panel and then use them over and over for all jobs. Or if you're printing several jobs with manual feed, set up the paper source as Manual Feed; the setting will stick, so you don't have to switch the paper source for each job.



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# Quick Tips

## Tips, Tricks, and Shortcuts

by Lon Poole

What a nuisance it is to type phone numbers with area codes in parentheses using the numeric keypad on your keyboard—your right hand has to travel from the keypad back to the parenthesis keys (9 and 0) on the main keyboard. You have the same hassle when you enter hours and minutes separated by colons. Clement Topping, of Montreal, Quebec, uses CE Software's QuicKeys ($119; 515/221-1801, www.cesoft.com) to eliminate this hassle. He assigns the parentheses to numeric-keypad keys, using shift-= (equal sign) for open parenthesis, shift-/ (slash) for close parenthesis, and shift-. (period) for a colon. You can also make these keyboard reassignments with other macro programs such as BinarySoft's KeyQuencer ($50; 310/449-1481, www.binarysoft.com) and Westcoast Software's One Click ($69.98; 619/487-9200, www.westcoastsoft.com).

### Grabbing Video

**Q.** What software do I need in order to grab frames from video recordings and print them as still images? I have a Power Mac 8600 running Mac OS 8 and an Epson Stylus Photo printer.

STEVE REMOLE
*Plymouth, Minnesota*

**A.** You can capture video through your Mac's video-input port by using the Apple Video Player, which is installed with the Mac OS if your Mac has compatible video equipment (such as an AV card, built in or purchased separately). This program displays incoming video in its Video window. You use controls in a separate Controls window to select the video source, adjust the picture, and capture PICT files (SimpleText pictures) or QuickTime movie files, as shown in "Capture Pictures and Movies." For detailed instructions, open the Apple Video Player and choose Apple Video Player Guide from the Help menu (Mac OS 8 and 8.1) or the Guide menu (Systems 7.5 through 7.6.1). If you want more control over video capture and don't mind the additional complexity that comes with it, try Milton Aupperle's $25 shareware duo MyVidCapture and



MyVidEditor (403/228-0982, www.cadvision.com/ASC/MVEMVC.htm).

After capturing a PICT file using any of these methods, you can edit and print it with an image-editing program. For example, you can use Adobe Photoshop or MicroFrontier's Digital Darkroom to apply a deinterlace filter to smooth the video image before printing. You can also print PICT files with the ImageViewer program, included with QuickTime 3.0, and you can print small PICT files with SimpleText.

### Spurious File Translation

**Q.** After I installed QuickTime 3.0, I began having trouble opening plain-text files in Corel WordPerfect. A dialog box would tell me the program that created the file couldn't be found and would ask whether I wanted to open the file with QuickTime translation. Furthermore, when I used my HTML editor (Optima System's PageSpinner 2.1) to open a WordPerfect file saved as text-only—previously a straightforward operation—an error message would say that the file couldn't be opened because WordPerfect couldn't be found and that the file couldn't be translated because error –2048 had occurred. When I replaced all the QuickTime 3.0 files and extensions with their prior versions, everything returned to normal. What's the story?

JOHN LORETZ
*Somerville, Massachusetts*

**A.** You've encountered a long-standing problem with the Mac OS Easy Open control panel that QuickTime 3.0 seems to trigger when some programs try to open text files they didn't create. QuickTime 3.0 also triggers this problem when you select a printer description file (PPD) by using the Chooser, the Finder's Printing menu, or the Desktop Printer Utility (included with LaserWriter 8.5.1 and Mac OS 8.1). In these cases, Mac OS Easy Open displays a dialog box asking you to select an alternative program to open the text or PPD file. Your options will include the program you're using (Finder, Chooser, System, Desktop Printer Utility, and the

*continues*

e same program "with Quick-ation." If you choose anything with QuickTime translation," you will get an error message that mentions error –2048. This same message will appear every time you open a text file with the same program or select a PPD file.

To prevent the –2048 error messages, never select an alternative program that includes "with QuickTime translation." Instead, select the program you are using (WordPerfect, in your case), without any translation. If the dialog box doesn't list the program without translation, turn off the Show Only Recommended Choices option in the dialog box.







**Capture Pictures and Movies** While watching video input with the Apple Video Player program, you can save a single frame as a picture file, copy a frame to the Clipboard, or save a video sequence as a QuickTime movie (at left). Click the icon on the left side of the Controls window to switch between the capture controls (at right) and the controls for video source and picture.

You can clear up –2048 error messages by opening the Mac OS Easy Open control panel and clicking its Delete Preferences button. An alert box asks you to confirm that you want to delete all Easy Open preferences. Clicking Delete causes Easy Open to forget all the alternative programs you have ever selected.

If you don't want to delete all Easy Open preferences, you can instead turn on the Always Show Dialog Box option in the Mac OS Easy Open control panel. Doing so forces Easy Open to ignore the saved preferences and ask you for an alternative program again each time a translation opportunity comes up. Once you have selected the alternative programs correctly, you can turn off the Always Show Dialog Box option, however.

You can also eliminate this problem by turning off automatic document translation in the Mac OS Easy Open control panel. Turning off this control panel's Translate 'TEXT' Document option puts a stop to the dialog boxes asking for alternative programs for text files but doesn't stop the –2048 errors. As a side effect, turning off this option may cause Windows and DOS files to open on your Mac as text documents, even if they are not.

## Blazing FileMaker Image Fields

**TIP** In the article "Make FileMaker Work the Web" (*Create*, June 1998), the sample FileMaker Pro files have the images pasted inside them. While this might be a simple way for people accustomed to using FileMaker Pro to get images into a database, it also bloats the database file size tremendously. For blazing database performance on the Web, store images outside the database as separate GIF or JPEG files. Then, instead of pasting each image into a picture field, create a text field with the image file's URL (the path relative to the FileMaker Pro server). Wherever you specify this field as part of an FDML (FileMaker Dynamic Mark-up Language) tag, be sure to specify the Raw parameter to ensure that FileMaker uses the image file's URL as is, without any character encoding. Here is an example:

**<img src="[FMP-field:*imageURL*,raw]" border="0">**

This tag sends the image file's URL from the FileMaker field named imageURL to the browser, which shows the image. You can even get fancy and use calculations that construct the image files' URLs from other fields such as item name and product category, provided you name your image files and set up your folder structure accordingly.

JOHN QUEENAN
*Hingham, Massachusetts*

## SCSI Abundance

Color my face red. Contrary to the blanket assertion in July's *Quick Tips*, you can in fact generally connect more than seven SCSI devices to a Mac that has multiple SCSI buses. Larry Lloyd, of Coppell, Texas, was the first of several readers to point out that the Mac's system software has accommodated multiple SCSI buses for years. However, your SCSI devices must have driver software that recognizes multiple buses. (Technically, the drivers must comply with SCSI Manager 4.3, which is part of System 7.5.3 and later and is available as a separate extension for earlier system versions.) This isn't a problem for hard drives and other storage devices made in the last four or five years, but an older storage device or scanner may not work if it has the same ID number as a device on another SCSI bus. If you have such a device, check with its maker for updated software.

The Power Mac 900, 950, 8100, 8500, 8600, 9500, and 9600 all have separate internal and external SCSI buses, as do the Umax SuperMac J700 and S900; Power Computing PowerTower Pro, PowerWave, and PowerCenter Pro; DayStar Genesis; and Akia MicroBook Power 604e. Note that many other models have internal and external SCSI connectors for a single bus. You can add more SCSI buses to any Mac that has PCI or NuBus expansion slots by installing a SCSI accelerator card, such as one from Adaptec (408/945-8600, www.adaptec.com) or Atto (716/691-1999, www.attotech.com).

Each separate SCSI bus can have up to seven devices, although connections to the internal bus are limited by space, the number of connectors, and the available power for internal SCSI devices. All devices on the same bus must have unique IDs. ■

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LON POOLE answers readers' questions and selects reader-submitted tips for this monthly column. His latest book is *Macworld Mac OS 8 Bible* (IDG Books Worldwide, 1997).

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All shareware and freeware mentioned in *Quick Tips* is available from the Macworld Online software library (www.macdownload.com).

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# Set Your Video on FireWire

## Tips for Making the Transition to Digital-Video Production

by Jim Heid

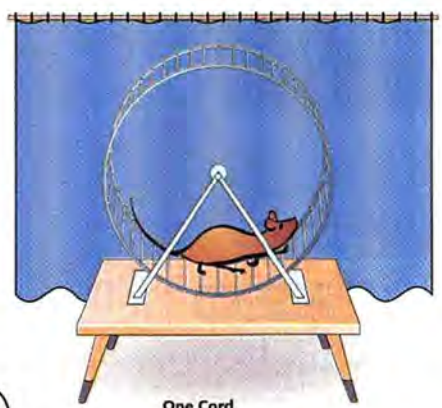
Desktop video has been transformed—not by a new software package or a blazingly fast Power Mac but by a system that uses a videocassette smaller than a business card. I'm referring to the DV (Digital Video) standard. DV changes everything, starting with the basic process of getting video from tape onto a hard disk so you can edit it. With conventional analog videotape, capturing video requires sophisticated digitizing cards, ultrafast hard drives, and a System Folder stripped of unessential extensions that can bog down performance and cause loss of video frames. The whole process is like crossing a yawning chasm on a fraying rope bridge: one misstep, and your quality is history.

In the DV world, video is digitized within the camcorder itself. Rather than recording analog audio and video, a DV camcorder stores bits. Consumer DV camcorders generally cost $2,000 to $3,000 and deliver exquisite video quality (good enough for broadcast) and CD-quality audio.

Here's help on understanding how the DV production process differs from the analog-video production process. Also, for producers working on movies destined for CD-ROMs or Web sites, I highlight some important issues of editing DV footage.

*continues*

## The Digital-Video Advantage



### Analog-Video Setup

With conventional analog-video gear, you use your Mac to digitize the video and audio. That means grappling with a rat's nest of cables and probably buying an expensive, high-speed disk array.

**Up to Four Cords**
For video-in and -out, audio-in and -out (depending on the camera).

**Disk Array**

Digitizing takes place in computer.

**JPEG Card (internal)**
Cost: several thousand dollars for full-screen, full-motion video at broadcast quality.

**One Cord**
FireWire cable is bidirectional: a single cable carries both audio and video data to and from the camcorder.

### Digital-Video Setup

With a DV system, digitizing takes place in the camcorder. Rather than storing analog video and audio tracks, a DV cassette stores a stream of bits, which you then transfer to your Mac via FireWire.

Digitizing takes place in camera.

**FireWire Card (internal)**
Cost: about $500 for the same video quality you get with a much pricier JPEG card.

No disk array necessary—you need only a single hard drive. It should have a capacity of 4GB or more and 3.6-MBps or faster throughput.

ARNE HURTY

## Easy DV Downloading

IF YOU'VE EVER DIGITIZED VIDEO FROM A CONSUMER-GRADE ANALOG CAMcorder, you're familiar with the struggle of simultaneously clicking on the Capture button on your Mac and pressing the camcorder's Play button. With a DV camcorder, you can be rid of such difficulties. Many DV camcorders, such as the Sony DCR-VX1000, can be remotely controlled via FireWire. Similarly, most FireWire downloading products (including Radius's MotoDV) let you use your Mac to control playback of the videotape in the camcorder—a tremendous convenience that used to require costly device-control hardware.

Here's a look at the DV downloading process and some tips for the best results.

**A** Radius's MotoDV displays your chosen hard drive's throughput so you can verify that it meets DV's 3.6-MBps requirement.

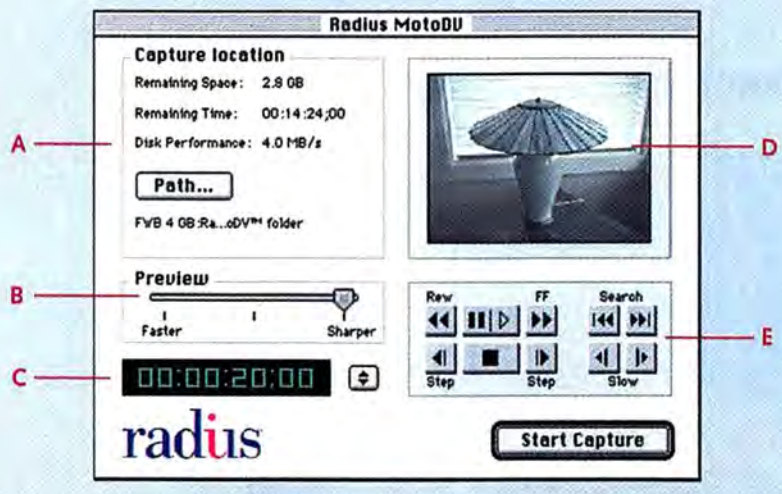
**B** If the video doesn't play back smoothly in the preview area, drag the Preview slider closer to Faster.

**C** A DV camcorder stores SMPTE time-code information as you record; a capture program displays this as the tape plays back. You can note the time code of specific frames for reference.

**TIP** Some DV camcorders reset the time code to zero if you leave unrecorded spots on the tape (by fast-forwarding a second or two between scenes, for example). To get the best time-code results, don't fast-forward between scenes and don't eject the DV cassette until you're sure you won't be adding new scenes to it.

**D** The preview area displays the incoming video stream as the tape is played.

**E** These transport buttons work like buttons on a VCR—with a few additions—to let you remotely control your camcorder from your Mac.




### The DV Way to Grab Footage

To bring DV footage into a Mac for editing, you could use conventional capture hardware, connecting the hardware's video input to your DV camera's video output. But this approach would introduce quality-compromising conversions between digital and analog. In the DV world, it's preferable to simply move the already digitized video over to the Mac. And to do that, you use *FireWire*.

Originally designed by Apple, FireWire is a high-speed data-transfer interface and an industry standard that also goes by the catchy name of IEEE 1394. FireWire provides sizzling transfer speeds and doesn't require that you futz with terminators and address switches, or even power down before connecting and disconnecting FireWire-equipped peripherals. Think of it as SCSI without all the scuzziness.

With DV, a single, slender FireWire cable carries both the video and the audio streams. There's no need to connect separate cables and worry about introducing audio hum. And you don't have to get tangled in a separate set of cables when it's time to output your video from the Mac to videotape: that single FireWire cable transfers data in both directions (see "The Digital-Video Advantage").

Most DV camcorders provide FireWire connectors—but currently no Mac does. You'll need a FireWire PCI card, available from companies such as Pinnacle Systems (650/526-1600, www.pinnaclesys.com) and Radius (408/541-6100, www.radius.com). You can expect to pay between $400 and $600 for a good-quality card. For this story, I used Radius's MotoDV ($499), which includes a FireWire PCI card and utilities for downloading video and transferring it back to tape. Radius's $999 EditDV includes MotoDV as well as Radius Edit, a first-rate video-editing program.

**FireWire and DV Benefits** One of the many beauties of FireWire-based DV editing is that you can control your camcorder by using your card's capture program. Using the on-screen transport buttons, you can play, stop, fast-forward, and rewind video and view one frame at a time (see "Easy DV Downloading").

Yet another DV advantage concerns storage devices. Whereas many conventional video-editing systems require disk arrays that can support data-transfer rates of 8MB or more per second, DV requires a transfer rate of just 3.6 MBps, well within the capabilities of today's high-capacity hard drives. For my tests, I used a Micropolis 4GB AV hard drive in a Power Mac 7600/132—hardly a sizzling configuration—and got smooth, clean captures.

**DV Downloading Tips** Although DV's transfer-rate requirements are modest, it's still wise to defragment your hard disk before capturing video, to avoid the possibility of dropping frames. And if your Mac and hard drive have trouble keeping up with the incoming data stream, try boosting your capture utility's memory allocation. Also, use your Mac's Memory control panel to turn off virtual memory and reduce the disk cache to its minimum size.

### Avoiding Editing Snags

In the analog world, *full-screen* video usually means video frames measuring 640 by 480 pixels. If you're capturing

analog video for a CD-ROM project or a Web site, you probably capture at a smaller size, such as 320 by 240 pixels, and perhaps at a slower frame rate, such as 15 frames per second (fps). These measures conserve hard-disk space and speed the rendering of effects and transitions.

But DV is different. For starters, the DV frame size is 720 by 480 pixels, and because the DV capture process simply involves downloading bits, you don't have the option of capturing at a smaller size or a slower frame rate. This means DV clips inhale disk space: 10 minutes of DV footage consumes over 2GB.

And where most consumer-grade video equipment produces square pixels, DV pixels are rectangular. DV's nonsquare pixels can cause image distortion if your final product is destined for CD-ROMs or the Web, where pixels are square.

Fortunately, there are ways to solve these problems:

• Put DV on a diet. If your production is destined for broadcast or videocassette, there's nothing you can do about DV's appetite except buy a higher-capacity hard drive. But if you're producing for CD-ROMs or the Web, you can put your captured clips on a diet plan and reclaim some hard-disk space in the process (see "Slimming Clips for Multimedia Work").

• Resize the right way. If you use Apple's Movie Player to resize a DV clip to, say, 320 by 240 pixels, you may get ugly visual artifacts, because of the quick-and-dirty technique QuickTime uses to resize DV's nonsquare pixels. A much better tool for resizing is Terran Interactive's awesome Media Cleaner Pro 3.0 ($359; www.terran-int.com), which automatically applies a high-quality resize routine to DV clips you're compressing into square-pixel format.

• Render with DV in mind. If you're using a 3-D–rendering package to create an image or an animation sequence for outputting to DV, be sure to render at a 720-by-480-pixel frame size rather than at 640 by 480. That way, you won't introduce distortion by scaling a 640-by-480 clip up to 720 by 480.

• Crop the edges. In the DV format, the outer edges of the frame contain a thin border of solid-black pixels. These extraneous pixels don't appear on a television, but they will appear if you shrink the movie's frame size for a CD-ROM or Web project. Crop them out, using your video-editing application or Media Cleaner Pro.

## Vive la DV Différence

If you've spent time digitizing analog video and agonizing over dropped frames and reduced quality, you owe it to yourself to check out the DV difference. Sparkling audio and video quality, lossless transfers from tape to hard disk and back again, remote camera control—these are the kinds of luxuries that cost a healthy five figures a few years ago and didn't even exist a few years before that.

Now they're within the range of business-video producers, schools, and advanced hobbyists. DV is dreamy video. **m**

JIM HEID (www.heidsite.com) has been writing about digital-video technology for *Macworld* since QuickTime debuted, in 1991.

## Slimming Clips for Multimedia Work

VIDEO PROFESSIONALS ADVISE DOING EDITING WORK WITH FULL-SCREEN, 30-fps source clips, even if your final movies will go on a CD-ROM or a Web site. That's sound advice, and heeding it preserves quality and leaves you the option of creating videotape versions of your efforts. But it ignores the fact that many people aren't using maxed-out Macs to do their video editing.

If your machine isn't fast enough to play and render full-size DV clips within a reasonable lifetime, transcode them to a smaller size and a slower frame rate. For such jobs, I use Terran Interactive's Media Cleaner Pro, but you can instead use a video-editing program such as Adobe Premiere.

**Frame Size and Rate** Try a 320-by-240-pixel frame size and a frame rate of 15 fps. These are common settings for CD-ROM–based video and good starting points for Web clips, which are usually even smaller.

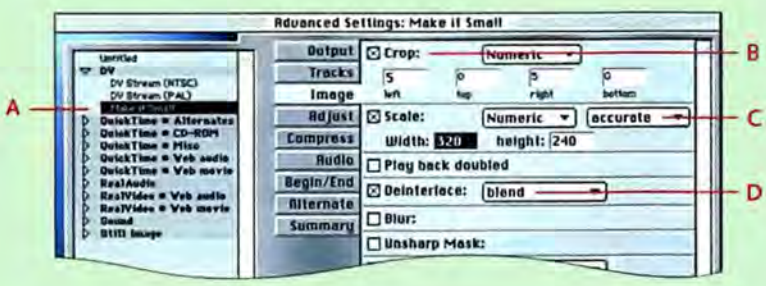
**Compression** Recompress the DV footage in your video-editing program, using QuickTime's built-in Animation codec and specifying the highest-quality setting. At this setting, the Animation codec is lossless—there's no change in image quality—so you don't need to worry about degrading video quality by doing multiple compressions. And all but the oldest Power Macs are fast enough to play back Animation-compressed clips smoothly, so you won't have to endure the choppy playback from which full-screen DV clips suffer.

A To save time, create a Media Cleaner Pro setting for your recompression efforts.

B Remember to crop out the extraneous rows of pixels your camcorder adds to the frame.

C Media Cleaner Pro's "accurate" scaling option compensates for DV's nonsquare pixels.

D DV is *interlaced* video, comprising alternating fields (60 per second). CD-ROM and Web video are not interlaced, so when recompressing, you must specify how each video field is handled. The Blend option generally provides the smoothest motion, but if blended clips look a bit fuzzy, try either the Odd or the Even option, both of which discard one field. Note that these options preserve sharpness but can introduce a jittery quality in the final video.



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# Building Extraordinary Charts and Graphs

## Revisualize Your Vital Data with Illustrator, FreeHand, and Photoshop

by Janet Ashford

Part of being human includes feeling the urge to make charts and graphs. Technical diagrams were created as far back as 20,000 years ago, when cave dwellers in France carved marks into stone to keep track of lunar cycles and predict the foaling time of wild mares. Modern charts and graphs still depict scientific data and statistics, although more often for businesspeople and academics than for hunter-gatherers. But over the millennia, the best graphs and charts have shared three main features: they're accurate, easy to understand, and visually memorable.

To create good graphs and charts, you need a little knowledge of information-display theory, an understanding of statistics, and a good sense of design. The visual appearance of an infographic should always serve the information the graph presents, not distort it or distract attention away from it. Existing charts and graphs may provide inspiration but won't always serve as a source of ideas to swipe—the best design grows out of the type of data being presented.

### Getting Graphs Right

Graphs depict one or more variables in relation to other variables. The type of graph you choose depends on the kind of data you're presenting, and the design should lend itself to both the data and the graph type.

**CHOOSE THE RIGHT GRAPH TYPE** If your goal is to show the relationship of parts to a whole—for example, the relative amounts of vegetables, fruits, grains, and fat in a healthy diet—a pie graph will work best. If you want to show how data varies over time—such as the weekly closing values of the Dow Jones—a line graph (which plots points and connects them with lines) or a bar graph will work well. Your challenge is to make sure the width of the pie pieces, the position of the dots, or the height of the bars accurately depicts the data.

**PREPARE YOUR DATA** A calculator comes in handy for creating graph elements of the correct size and position. But Adobe Illustrator's automatic graphing function makes the process a little simpler: you enter graph data into Illustrator's small spreadsheet—or import data from a spreadsheet program such as Microsoft Excel—and then choose one of several graph types with which to display the data.

Illustrator's arsenal includes columns and stacked columns; bars and stacked bars; and line, pie, area, radar, and scatter graphs. So long as its elements remain grouped, the graph's lines or shapes will automatically update when new data is entered into the spreadsheet. The graphs produced by Illustrator's graph tool are very plain, but you can use them as the basis for more-interesting treatments, done either in Illustrator or in Adobe Photoshop.

**CREATE A LOOK** When you've solved the problems of analyzing your data; determined the right type of graph to use; and created bars, lines, or other elements to accurately depict the numbers, the next challenge is to present these elements with visual flair. You can add various levels of visual interest without distorting the data. For example, you can use Photoshop filters to give texture to solid-color graphs, or you can use gradient fills in Illustrator to give bars a little drama (see "Simple Variations on a Graph"). Scanned photography can also add compelling visual impact to graphs and help drive home what the data represents (see "Using Photos to Make Gorgeous Graphs").

### Making Captivating Charts

Charts present information in tabular form and are a little easier to visualize

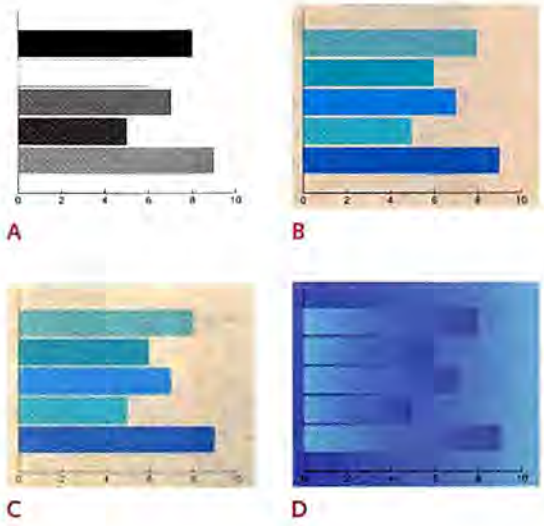
*continues*

## Simple Variations on a Graph

A FEW EASY TWEAKS CAN ENHANCE AN UNINSPIRING GRAPH DESIGN

AFTER USING ADOBE ILLUSTRATOR'S graph tool to create a bar graph (A), I used the rectangle tool to create a background rectangle and the Color palette to add different colors to the bars (B).

I then took graph B, rasterized it in Photoshop, and applied three filters: Add Noise, Dry Brush, and Colored Pencil (C). For more drama, I took graph B, filled the bars with a gradient, and filled the background rectangle with the same gradient but with the color angle reversed (D).



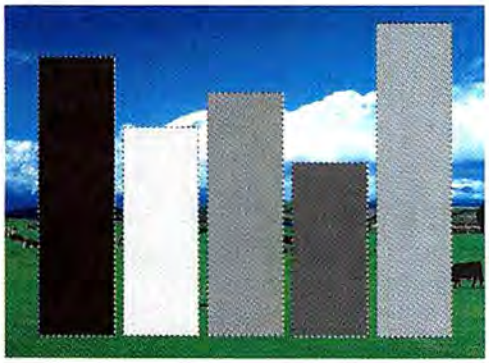
# Using Photos to Make Gorgeous Graphs

SCANNED PHOTOGRAPHS, IMAGES IMPORTED FROM A DIGITAL camera, or stock photography can make your graphs look drop-dead beautiful. To intensify the graph's impact, use imagery that relates to the subject your data represents. For this example, I wanted to make a graph that represents U.S. consumption of dairy products.

**1** First, I found a stock photo from Digital Stock Corp. of cows in a beautiful pasture and opened it in Photoshop.



**2** Then I imported an Illustrator graph and pasted it into a separate layer in the Photoshop file of the cows. I selected each bar in the graph with the Magic Wand tool and saved these outlines as a selection in a new channel by choosing Save Selection from the Select menu.



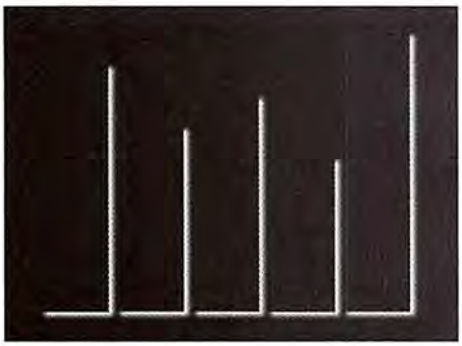
**3** Next, I chose Load Selection from the Select menu, made the cow-image layer active, inversed the selection, and pressed delete. This removed all parts of the photo except the areas that fell inside the outlines of the graph bars.



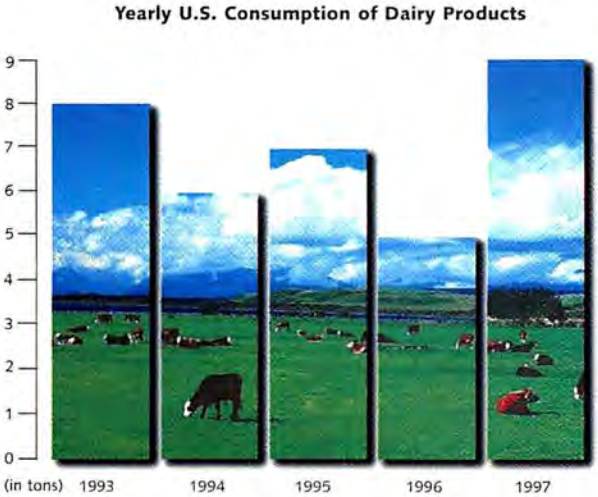
**TIP Choosing the Right Colors**

- A soft color palette can make statistics more palatable. In his book *Envisioning Information,* Edward R. Tufte recommends using light, muted colors drawn from nature—such as blues, yellows, and grays—to avoid garishness. Save bright, saturated colors for accents.
- Avoid red and green for distinguishing elements in a chart—these colors can't be differentiated by the 10 to 20 percent of the population that's color-blind.

**4** To add a dramatic drop shadow, I first created a copy of the new channel using Duplicate Channel from the Channels palette menu. I clicked on the original channel to make it active, applied the Offset filter to offset the bars slightly down and to the right, and applied the Gaussian Blur filter. Then I loaded the channel copy into the original and chose Fill from the Edit menu to fill the selection with solid black. This created a blurred mask in the original channel.



**5** In the Layers palette, I clicked on the cow layer, loaded the new mask selection from the original channel, and filled the selection with solid black to create soft drop shadows that make the photo-filled bars appear to float over the paper. I added text labels in Illustrator to finish the graph.



than graphs—you needn't worry about misrepresenting data with incorrectly sized pie slices or bars. The challenge in designing a chart, though, is to find ways of incorporating decoration or illustration that reinforces the content without distracting from it.

A simple table composed only of neatly arranged text often works just fine, especially if it's in a busy page layout that includes colorful illustrations. But if your chart must serve as a main illustration, try dropping a muted image—such as a photo or a texture—behind the chart's text and numbers. The key is to add subtle visual interest, so make sure the details in the image don't interfere with the text's readability. Solid-color backgrounds provide visual appeal without compromising readability, and striped backgrounds like the one in "Creating Inspirational Chart Backgrounds" can even aid the viewer in scanning the lines of text.

Despite our fascination with making charts and graphs, we often tend to think of them as being a dull but necessary graphic evil. However, if you apply just a little creativity and the right tools, it is possible for you to transform sleep-inducing infographics into visually striking illustrations. **m**

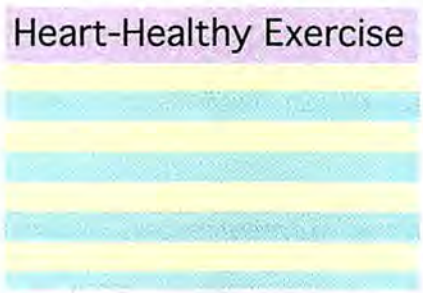
JANET ASHFORD (jashford@jashford.com) is the coauthor of *Getting Started with 3D* (Peachpit Press, 1998) and *Start with a Scan* (Peachpit Press, 1996).

**Design Resources**

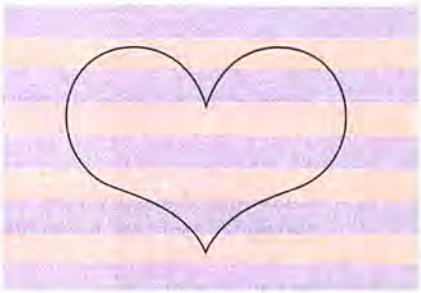
- *How to Lie with Statistics*, by Darrell Huff (W. W. Norton & Co., 1993), is a classic.
- Yale professor Edward R. Tufte's *The Visual Display of Quantitative Information* (Graphics Press, 1983), *Envisioning Information* (Graphics Press, 1990), and *Visual Explanations: Images and Quantities, Evidence and Narrative* (Graphics Press, 1997) are excellent guides for information design.
- *Graphis Diagrams 2: The International Showcase of Diagram Design and Technical Illustration* (Graphis Press, 1997), edited by B. Martin Pederson, provides inspiring examples of charts, graphs, and diagrams.

## Creating Inspirational Chart Backgrounds

USING RELEVANT BACKGROUND IMAGERY helps deliver chart information more effectively. Readers get a taste of what the chart is about before delving into the text, and it teases them into looking a little closer. This chart has a simple design that both visually hints at the subject matter and helps the viewer read the chart, thanks to its horizontal lines. In lieu of a background photo or texture, I masked a simple shape into the design.



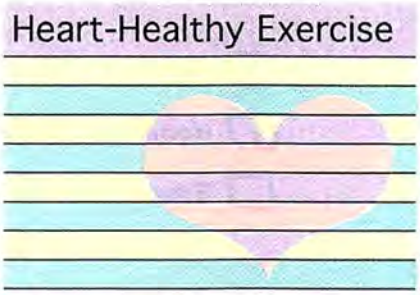

1 Using alternating colors for each line of a chart helps make it easier to scan the text lines from left to right. I used Macromedia FreeHand to create a striped background for my chart. The turquoise bars are simply thin rectangles placed over a larger gold rectangle.



2 I made a copy of the striped background and changed the colors to shades of pink. Then I typed a large heart symbol in the Zapf Dingbats font, used the Convert to Paths command to convert it to an outline shape, and placed it over the pink stripes. I temporarily gave it a black stroke to help me position it.



3 I selected the striped background elements, typed ⌘-X, selected the heart shape, and used the Edit menu's Paste Inside command to paste the stripes into the heart shape. I deleted the black stroke by choosing a stroke of None.




4 I positioned the striped heart over the chart background so that the heart's stripes lined up with those of the chart. Then I added thin black horizontal rules, using the Align panel to align them with the edges of the background stripes.




5 Finally, I added type, using FreeHand's type tool. The result is an easy-to-read chart that displays the information simply and clearly. The art and muted colors accent the data without distracting the reader.

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# Better Web Graphics with Transparency

## Unbox Your Images Using Photoshop and ImageReady

by Lynda Weinman

Unless you plan to publish only square and rectangular images on your Web site, you need to master the art of transparency (otherwise known as *masking*). Using this technique, you can create an irregularly shaped mask around an image so it blends into the background of your Web page. Without transparency, the image would appear in a rectangular box (the default shape for all image file formats). Using images with irregular shapes can greatly enhance the aesthetic appeal of your site, breaking up the monotony of all those rectangular photos, navigation bars, and frames.

Creating transparent images is tricky, though, because the standard masking procedures for print and imaging applications don't apply to Web graphics. The problem with GIF transparency is that the format supports only 1-bit masking. In other words, the mask is limited to a single value at a time—either on or off. Adobe Photoshop's 8-bit masking, in comparison, allows up to 256 values. This means that you can create subtle masking effects with partial transparency; for example, you can layer images that have feathered edges, glows, and drop shadows. It's important to understand GIF's 1-bit–masking limitation; if you aren't careful, your transparency efforts can easily go awry, resulting in images with halos and unattractive edges. The edge problem can usually be traced to how the image was antialiased (see "The Halo Problem").

It helps to know a little about Web file formats. Of the two most popular image formats for the Web, GIF and JPEG, only GIF supports transparency. To create irregularly shaped Web images, therefore, you have to start with a GIF—or learn to fake transparency with either a GIF or a JPEG.

Many graphics applications let you create transparent GIFs, but I'll focus on using two Adobe products: Photoshop and ImageReady. Where Photoshop was designed for print applications, the powerful new ImageReady was designed specifically for creating Web graphics; it has special matting features you won't find in any other product, including Photoshop.

By combining transparent foreground images with background tiles (see "Tile Your Site," *Create*, May 1998), you can create a layered visual effect that requires less bandwidth than a single giant foreground image. New techniques, such as Cascading Style Sheets and Dynamic HTML, let you layer and accurately position transparent graphics and animated effects.

With a little knowledge—and a good transparency tool—you can create great-looking graphics and buttons for your Web pages. ■

LYNDA WEINMAN is the author of several books on Web graphics. Check out her work at www.lynda.com.

## Transparent GIFs with Photoshop

ALTHOUGH PHOTOSHOP WASN'T DESIGNED SPECIFICALLY for Web graphics, it does make the process of creating transparent GIFs fairly easy: you simply reduce an image's color palette to 256 colors or fewer and then export it as a transparent GIF.

A From the Image menu, choose Mode and then Indexed Color. If the number in the Colors field is 256, try entering lower numbers to reduce the file size. This is also where you select the palette, color depth, and dither option.




B From the File menu, choose Export and then GIF89a Export to access Photoshop's GIF transparency tool. With the eyedropper, click on the color you wish to mask. Click on OK, and name the file.



## Transparent GIFs with ImageReady

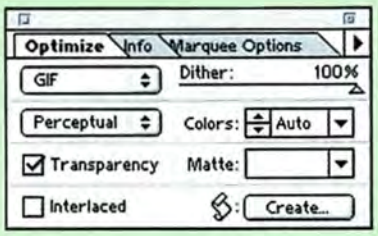
UNLIKE PHOTOSHOP, IMAGEREADY WAS DEVELOPED SPECIFICALLY for Web-graphics tasks, such as creating GIF transparency (see *Reviews*, in this issue, and "Web Design's New Dynamic Duo," July 1998). Its transparency features are superb, surpassing those in Photoshop 4.0 and 5.0. Download a trial version from www.adobe.com, and see for yourself; it'll spoil you for all other tools.

ImageReady uses the transparency inherent in layers—Photoshop's or its own—to create transparent GIFs, automatically masking anything with the telltale checkerboard pattern. You don't even need to convert your image to indexed color before you add transparency.

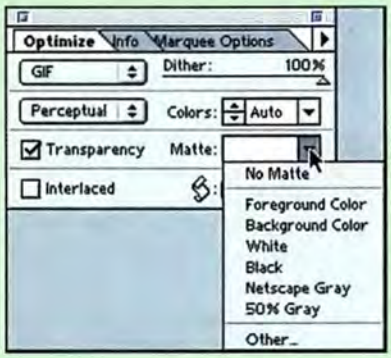
**A** Make sure the image is on a transparent layer—just look for the checkerboard pattern. If the image includes layers that don't relate to the mask you're creating, you need to turn them off; the transparent GIFs ImageReady creates contain only the layers you've turned on.



**B** Click on the Optimize palette, set the file format to GIF, and check the Transparency option.




**C** From the drop-down menu under Matte, choose a color from among the listed options (Other opens the Color Picker). To avoid halos, select either a custom color or No Matte. The No Matte setting is useful, because it aliases just the *edge* of the graphic; it doesn't alter the antialiasing of the rest of the image.




**D** Choose Save Optimized Copy As from the File menu, and name your file. If you want to preview the results before saving them, choose Preview In, under the File menu, and select a browser.



## Transparent Photographs with ImageReady

SO FAR I'VE FOCUSED ON CREATING TRANSPARENT GRAPHICS, but you can also create transparent photographs in ImageReady. Let's look at two types of photographic subjects: those with a solid-color background and those with a complex background.

### 1 Photograph with a Solid-Color Background

If your image is already against a solid-color background, as is the case with a lot of stock photography, you're in luck—this type of image is easy to work with. You simply place the image on a transparent background and then erase the background color using the Magic Eraser (hold down the mouse button, with your cursor on the standard eraser icon in the tool bar, to see the Magic Eraser option). This tool works like a standard Photoshop eraser, but it erases with transparency instead of a color.

**A** If you were to click on our sample image's white background with the Magic Eraser, the background would disappear and become transparent. You can set the tool to erase contiguous pixels or all similar pixel values; just double-click on the Magic Eraser tool to bring up the settings window and select Contiguous Pixels Only. You can also adjust the eraser's opacity and set other options in this window.



Before: white background



After: transparent background

**B** Once the image is on a transparent background, follow the instructions, above, for creating transparent GIFs with ImageReady (steps **B** through **D**).

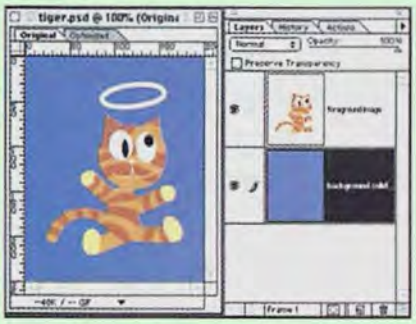
## The Halo Problem

MOST GRAPHICS APPLICATIONS AUTOMATICALLY ANTIALIAS images by blending colors together to smooth out the edges. This process works for most images, but antialiased edges in a transparent GIF can cause problems. Because antialiasing blends the edges of your image into a background color, you'll get an annoying fringe of color around the edges if your image's background color is different from that of your Web page. Here are a few ways around the problem.

A Use aliased edges in your artwork, by creating it with aliased brushes or pencil tools in Photoshop or ImageReady. This is the safest way to ensure that your transparent graphics look clean against any background color or pattern. If its edges weren't antialiased, the transparent image below would look fine against any color background.



B Choose the background color of your Web page as your antialiasing target color. In Photoshop or ImageReady, fill a layer with that color and insert it at the bottom level of the Layers palette. Whatever image is antialiased on the topmost layers will blend to the background color.



C Fake it. Rather than using transparency, you can simply place the image against the same background color as that of your Web page and publish it as a square or rectangular image. No one will be the wiser, because the edge of the image will blend in perfectly with the background (assuming the background isn't complex). This technique works with GIFs as well as JPEGs, as long as you use the same file format for the image and the background.



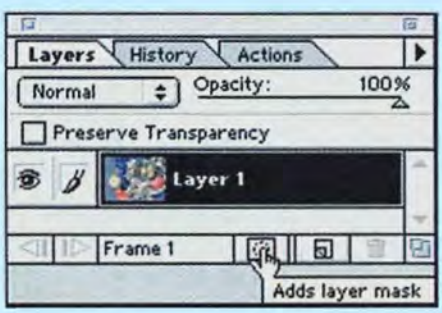




### 2 Photograph with a Complex Background

You don't always have the luxury of using a photograph with a solid-color background; if your photo has a complex background, you have to create a custom mask.

A Click on the Layer Mask icon, at the bottom center of the Layers palette. This creates a layer mask that appears to the right of your layer thumbnail image.

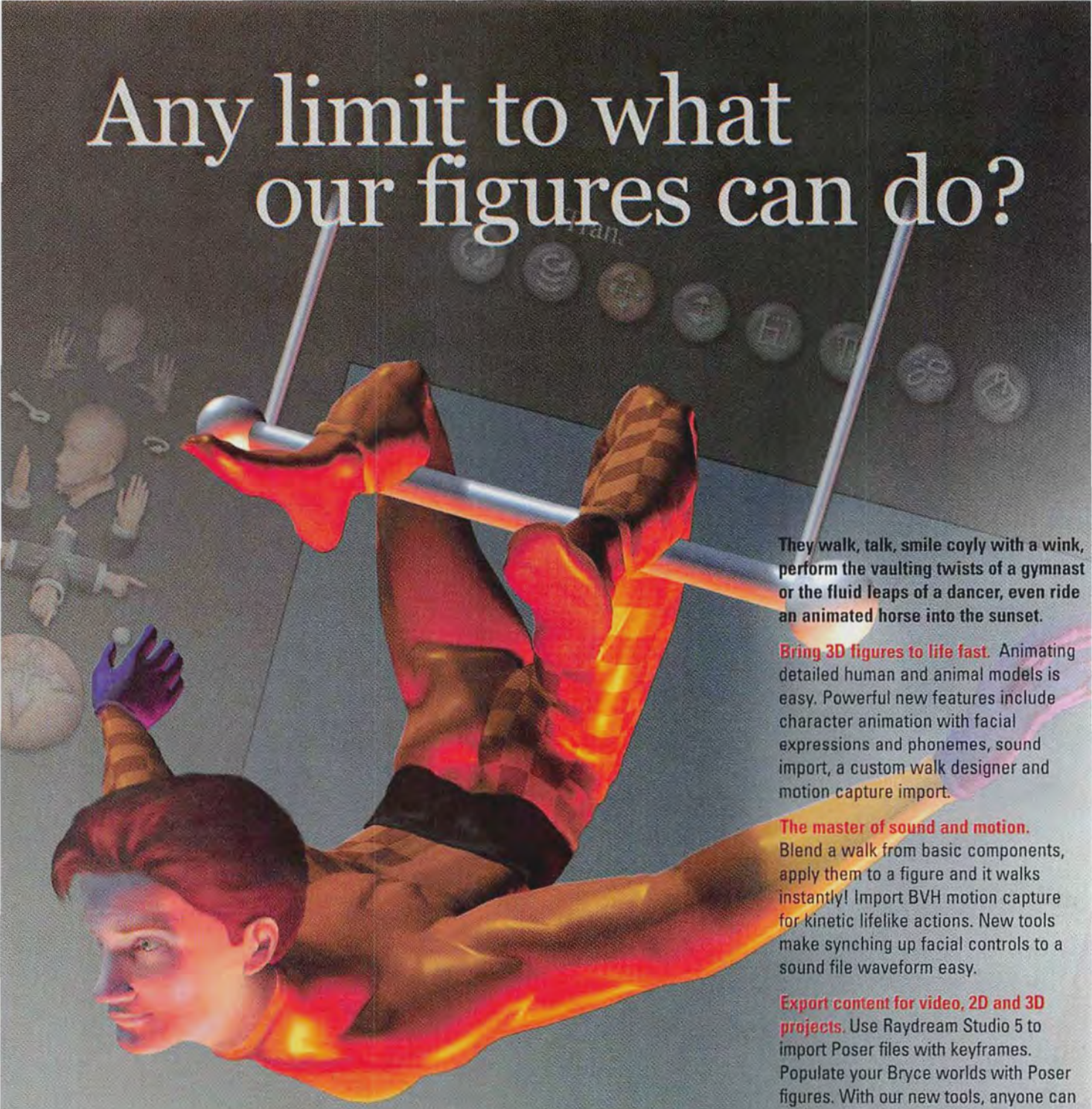



B Choose the paintbrush tool, select a brush, and begin painting (zoom into the image first, so you can paint the mask precisely). It's critical that the foreground color be black; if it isn't, you won't be able to paint the transparency mask.



C As in the first example, follow the instructions for creating a transparent GIF with ImageReady (steps B through D).

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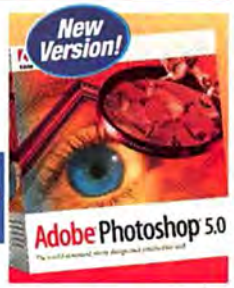
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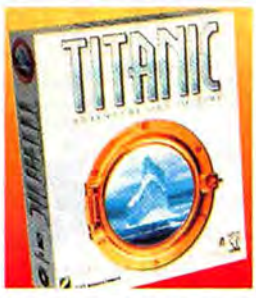
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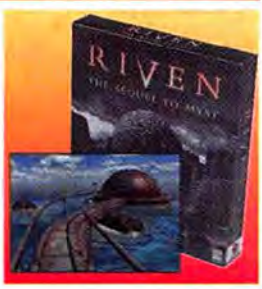
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*Price after $30 mfr's mail-in rebate. Price before rebate is $79.95. Price after rebate is $79.95. Ask for rebate coupon # AA1172. Offer expires 9/30/98.

**PAGE 4 OF 9**

## New Power Mac G3 266MHz Desktop!

APPLE 720 17" MONITOR Only $499! Item # MON0602




Only $1599! ASK FOR ITEM # CPU1204.

- 266MHz G3 Processor • 32MB RAM (768MB max.) • 4.0GB HD
- 24X Built-in CD-ROM • 512K Backside Level 2 Cache
- 2MB SGRAM • Built-in 10Base-T Ethernet

**TOP OFF YOUR G3 WITH ONE OF THESE APPLE MONITORS:**

MON0658: ColorSync 750 17" (16.1" viewable), .26mm, 1280 x 1024 ..... $799

MON0657: ColorSync 850 20" (19" viewable), .26mm AG, 1600 x 1200 @ 75Hz ..... $1599

**G3 SDRAM MEMORY UPGRADES:**

CHP0541: 32MB ..... $159.95
CHP0542: 64MB ..... $299.95

New G3s available at speeds up to 366MHz!

## NEW! POWER MAC G3/300MHZ DESKTOP

- 300MHz PowerPC G3 processor
- 64MB RAM (768MB max.)
- 6.0GB hard drive • 24X CD-ROM
- Built-in 100MB Iomega Zip drive
- 1MB backside level 2 cache
- 2MB SGRAM
- Built-in 10Base-T Ethernet

Only $1999!
Item # CPU1205




## NEW! POWER MAC G3/333MHZ MINITOWER

- 333MHz PowerPC G3 processor
- 64MB RAM (768MB max.)
- 8.0GB hard drive • 24X CD-ROM
- Built-in 100MB Iomega Zip drive
- 1MB backside level 2 cache
- 6MB SDRAM
- Built-in 10Base-T Ethernet

Only $2599!
Item # CPU1206




## NEW! POWER MAC G3/366MHZ MINITOWER

- 366MHz PowerPC G3 processor
- 128MB RAM (768MB max.)
- 4.0GB Ultra-Wide SCSI hard drive
- 24X CD-ROM drive
- 1MB backside level 2 cache
- 6MB SGRAM
- Built-in 10Base-T Ethernet

Only $2999!
Item # CPU1207




## NEW! MACINTOSH SERVER G3

- 300MHz PowerPC G3 processor
- 64MB RAM
- 4.0GB Ultra-Wide SCSI HD
- Built-in 100Base-T Ethernet

Only $2999!
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**Macintosh Server G3:**
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Power Mac G3/266MHz desktop. See left page for details.

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As low as **$2299!**

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**Only $2299!**
233MHz PowerPC G3 processor, 32MB RAM, 2.0GB HDD, 20X CD, 12.1" dual-scan color display, 10Base-T Ethernet
Ask for item # CPU1162.
Floppy drive sold separately. Call for details.

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- 2.0GB IDE hard drive
- 20X CD-ROM drive
- 10Base-T Ethernet
- 13.3" active-matrix display

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- 2.0GB IDE hard drive
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- 10Base-T Ethernet
- 14.1" active-matrix display

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- 250MHz PowerPC G3 processor
- 32MB SDRAM • 4MB SGRAM
- 1MB Backside level 2 cache
- 4.0GB IDE hard drive
- 20X CD-ROM • 56K modem
- 10Base-T Ethernet
- 13.3" active-matrix display

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- 292MHz PowerPC G3 processor
- 64MB SDRAM • 4MB SGRAM
- 1MB Backside level 2 cache
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- 20X CD-ROM • 56K modem
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**For PowerBook G3 Series**
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- K56Flex technology cuts Web page downloading time almost in half!

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- Compatible with CD-ROMs, audio CDs, Photo CDs and CD-R discs.

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- SDRAM DIMM
- Call for full selection

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- 166MHz PowerPC 603e • 16MB RAM
- 2.0GB hard drive • 8X CD-ROM drive
- 11.3" Active-matrix display

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- 12X CD-ROM • 33.6 modem • 12.1" Active-matrix display
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Item # RCPU0956

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*Reconditioned by an Authorized Apple Service Provider. Reconditioned computers may not include original application software. 90 days parts and labor warranty. All sales final. While supplies last.



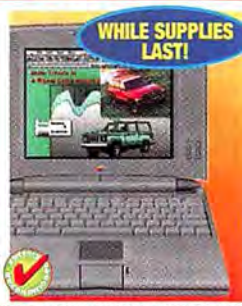

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## SONY 200ES 17" MONITOR

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SONY.

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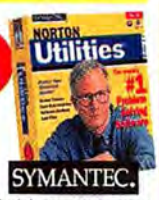
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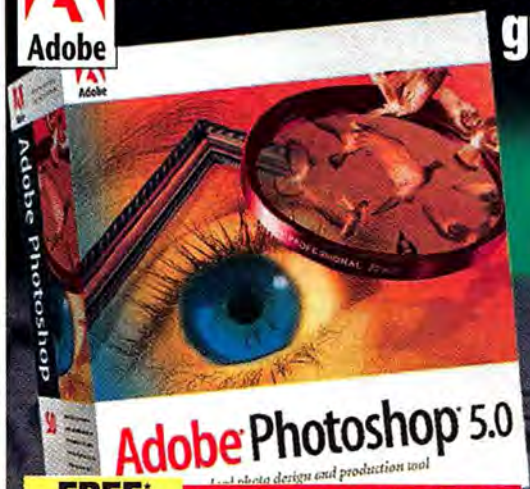
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Adobe

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**Upgrade** **$179.86** CDW 111216

### Apple® Power Macintosh®

*G3/300 desktop*

✦ 300MHz PowerPC™ G3 processor ✦ 1MB backside Level 2 cache ✦ 64MB RAM ✦ 6GB hard drive ✦ 24X CD-ROM drive ✦ Integrated Iomega Zip drive



Monitor sold separately

New!

**$1999.00** CDW 124952

**Apple® Power Macintosh® G3/266 desktop** **$1599.00** CDW 124946

✦ 32MB RAM ✦ 4GB hard drive ✦ 24X CD-ROM

### Office 98



Microsoft

New version!

✦ Office 98 Macintosh Edition features Microsoft® Word 98, Microsoft Excel 98, Microsoft PowerPoint® 98, Microsoft Outlook™ Express and Microsoft Internet Explorer

**Upgrade** **$258.94** CDW 103487

**Full version** **$447.97** CDW 103486

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New!

✦ LiveUpdate provides fast virus definition ✦ AutoRepair automatically scans and repairs the most dangerous virus infections ✦ Universal SafeZone provides safe quarantine of downloaded viruses, so they can be scanned and repaired before they enter your main computer environment

**$64.88** CDW 107665

## COMPUTERS

**Apple iMac Series**
233MHz PowerPC G3 32MB 4GB 24X ..... 1299.00
**Apple® Power Macintosh® Series**
233MHz PowerPC G3 32MB 4GB 24X ..... 1399.00
233MHz PowerPC G3 32MB 4GB 24X mini-tower ..... 1649.00
G3 266MHz PowerPC G3 32MB 4GB 24X Iomega Zip drive ..... 1699.00
266MHz PowerPC G3 32MB 6GB 24X Iomega Zip drive mini-tower ..... 1989.00
266MHz PowerPC G3 128MB 4GB 24X mini-tower ..... 2549.19
300MHz PowerPC G3 64MB 4GB 24X mini-tower ..... 3359.00
300MHz PowerPC G3 128MB 2x4GB 24X mini-tower ..... 3179.49
**Apple® Power Macintosh® Server G3 Series**
233MHz PowerPC G3 64MB 4GB 24X mini-tower ..... 2598.65
266MHz PowerPC G3 128MB 2x4GB 24X mini-tower ..... 3498.77
300MHz PowerPC G3 128MB 2x4GB 24X mini-tower ..... 3638.72
**Apple® Macintosh® PowerBook® Series**
233MHz PowerPC G3 32MB 2GB 12.1" DS 20X ..... 2299.00
233MHz PowerPC G3 32MB 2GB 12.1" DS 20X 56K bps ..... 2579.00
233MHz PowerPC G3 32MB 2GB 13.3" AM 20X ..... 2999.00
233MHz PowerPC G3 32MB 2GB 14.1" AM 20X ..... 3499.00
250MHz PowerPC G3 32MB 4GB 13.3" AM 20X 56K bps ..... 3899.00
292MHz PowerPC G3 64MB 8GB 14.1" AM 20X 56K bps ..... 5599.00

AM = active-matrix display DS = dual-scan display

## HANDHELD COMPUTERS

PalmPilot Professional ..... 287.36
Palm III ..... 367.46

## MONITORS

ColorSync 17 17" (16.1" view) 0.26mm ..... 799.00
ColorSync 20 20" (19" view) 0.26mm ..... 1599.00
MultipleScan 720 17" (16" view) 0.28mm ..... 499.00
AppleVision 850 20" (19" view) 0.26mm ..... 1609.74

MITSUBISHI

87TXM 17" (16" view) 0.25mm AG ..... 526.99
91TXM 21" (19.7" view) 0.28mm AG ..... 1064.38

PHILIPS MAGNAVOX

MV5011 15" (14" view) 0.28mm ..... 159.89
107S 17" (16.2" view) 0.28mm ..... 317.76
109S 19" (17.9" view) 0.26mm ..... 564.13

NEC

A500 15" (13.8" view) 0.28mm ..... 228.99
E500 15" (13.8" view) 0.25mm ..... 476.76
A700 17" (15.6" view) 0.28mm ..... 409.65
E700 17" (15.6" view) 0.25mm ..... 528.99
P750 17" (15.6" view) 0.25mm ..... 759.76
E900 19" (18" view) 0.28mm ..... 759.76
P1150 21" (19.6" view) 0.28mm ..... 1108.72

SONY

100ES 15" (14" view) 0.25mm ..... 264.49
200ES 17" (16" view) 0.25mm ..... 469.91
400PS 19" (18" view) 0.27mm ..... 869.23
500PS 21" (19.8" view) 0.26mm ..... 1418.07

## MONITORS

ViewSonic®

G771 17" (16" view) 0.27mm ..... 369.50
GS771 17" (16" view) 0.27mm ..... 368.50
G790 19" (18" view) 0.26mm ..... 617.54
G800 20" (18.4" view) 0.28mm ..... 949.23
G810 21" (20" view) 0.25mm ..... 947.28
P775 17" (16" view) 0.25mm ..... 508.60
P5790 19" (18" view) 0.25mm ..... 685.38
PT813 21" (20" view) 0.28mm AG ..... 1329.14
P815 21" (20" view) 0.25mm ..... 1249.40

## VIDEO BOARDS

ATI

Nexus GA 8MB PCI ..... 489.96
Xclaim TV external TV tuner ..... 81.07
Xclaim VR 4MB PCI ..... 246.76
Xclaim 3D RAGE PRO 4MB PCI ..... 177.90
Xclaim 3D RAGE PRO 8MB PCI ..... 234.03

Matrox

Ultimate Rez 2D/3D 8MB PCI ..... 556.63
ix3D Pro Rez 8MB PCI Power Mac ..... 269.12
Twin Turbo 8MB PCI Power Mac ..... 426.58
Turbo TV video capture PCI ..... 98.60

## COMMUNICATIONS

Megahertz 33.6 Ethernet 10BT PC Card w/RJ11 ..... 307.94
Megahertz 56K cellular PC Card ..... 218.34
Courier I-modem ..... 346.82

TelePort 56K V.90 external ..... 149.25
TelePort 56K PLUS Mac OS 8 x2 external ..... 169.10
56K bps fax/modem PC Card ..... 179.09
56K bps fax/modem/Ethernet PC Card ..... 269.32

3Com U.S. Robotics

Sportster 33.6 external ..... 106.71
Sportster 56K Faxmodem external ..... 147.98

## DATA STORAGE

Iomega

Zip drive 100MB external ..... 119.95
Zip drive 100MB internal ..... 119.95
ZipPlus drive 100MB external ..... 199.95
100MB Zip disk 3-pack ..... 49.95
Jaz drive 1GB external ..... 299.95
Jaz drive 2GB internal ..... 399.95
Jaz drive 2GB external ..... 399.95
1GB Jaz disk 3-pack ..... 269.95

## DATA STORAGE

LaCie

24X CD w/FM tuner external ..... 169.00
32X CD external ..... 169.00
4X8 CD-Recordable external ..... 499.00
4X2X6 External CD-ReWritable drive ..... 669.00
2.1GB Quantum Ultra SCSI-3 internal ..... 209.00
3.2GB Quantum ST Ultra SCSI-3 internal ..... 229.00
6.4GB Quantum ST Ultra SCSI-3 internal ..... 429.00
9.1GB Quantum Ultra SCSI-3 internal ..... 699.00
3GB Apple drive Ultra SCSI-3 external ..... 379.00
4GB Apple drive Ultra SCSI-3 external ..... 419.00

Quantum

2.1GB Fireball SE Ultra SCSI-3 ..... 234.93
3.2GB Fireball SE Ultra SCSI-3 ..... 269.16
4.3GB Fireball SE Ultra SCSI-3 ..... 309.37
6.4GB Fireball SE Ultra SCSI-3 ..... 399.76
8.4GB Fireball SE Ultra SCSI-3 ..... 519.27

## SCANNERS

AGFA

SnapScan flatbed scanner ..... 379.97
SnapScan 310 flatbed scanner ..... 206.63
SnapScan 600 Art Line flatbed scanner ..... 438.62

EPSON

Expression 636 Executive scanner ..... 599.00
Expression 636 Artist scanner ..... 799.00
Expression 636 Professional scanner ..... 1199.00
Expression 836XL scanner ..... 2499.00

Hewlett Packard

HP ScanJet 6100cse flatbed scanner ..... 799.00

MICROTEK

ScanMaker E3 Plus scanner ..... 127.48
ScanMaker V600 scanner ..... 179.44
ScanMaker 6400XL scanner ..... 929.79

Nikon

Super CoolScan LS 2000 film scanner ..... 1815.91

Polaroid

SprintScan 35LE film scanner ..... 684.72
SprintScan 35ES film scanner ..... 1087.17
SprintScan 35+ film scanner ..... 1508.45

UMAX

Astra 610S flatbed scanner ..... 129.00
Astra 1200S flatbed scanner w/full Adobe PhotoDeluxe ..... 249.00
PowerLook II Duo Advance flatbed scanner ..... 1295.00
Mirage IIse flatbed scanner w/MagicScan software ..... 2995.00

Visioneer

PaperPort vx scanner ..... 109.13

## PRINTERS

LaserWriter 8500 ..... 1914.61

EPSON

Stylus Color 600 ..... 199.00
Stylus Color 800 ..... 299.00
Stylus Color 850 ..... 379.00
Stylus Color 1520 ..... 799.00
Stylus Color 3000 ..... 1999.00
Stylus Photo 700 ..... 279.00
Stylus Photo EX ..... 499.00

Hewlett Packard

HP DeskJet 340 portable ink jet printer ..... 265.85
HP DeskJet 1120Cse printer ..... 499.00
HP DeskJet 1600CM printer ..... 1944.25
HP LaserJet 6MP printer ..... 877.26
HP LaserJet 4000N printer ..... 1439.55
HP LaserJet 5si MX printer ..... 3023.87

## DIGITAL IMAGING

AGFA

ePhoto 307 digital camera ..... 235.80
ePhoto 1280 digital camera ..... 649.00

EPSON

PhotoPC 700 digital camera ..... 699.00

Kodak

DC120 digital camera w/Zoom lens ..... 599.00
DC200 digital camera ..... 499.00
DC210 digital camera ..... 699.00

Nikon

Coolpix 300 digital camera ..... 419.43
Coolpix 600 digital camera ..... 564.62
Coolpix 900 digital camera ..... 819.36

## UPS SYSTEMS

APC

PowerChute software for Novell NetWare ..... 61.46
Back-UPS Office ..... 104.76
Back-UPS 200 ..... 93.05
Back-UPS 500 ..... 149.99
Smart-UPS 420 w/PowerChute software ..... 238.60
Smart-UPS 700NET ..... 399.18
Smart-UPS 1000NET ..... 495.07
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SurgeArrest P7 Home ..... 9.63
SurgeArrest Personal ..... 22.48
SurgeArrest Pro ..... 29.57
SurgeArrest Network ..... 32.21

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## All-in-One Internet System for Your Home!

**Processor and Memory**
- 233MHz PowerPC G3 processor
- 512K Backside Level 2 Cache
- 117MHz dedicated 64-bit backside bus
- 66MHz system bus
- 32MB SDRAM (2 DIMM slots support up to 128MB)

**Storage**
- 4GB IDE hard drive
- 24X CD-ROM drive

**Expansion & Networking options**
- Two Universal Serial Bus (USB) ports
- One Infrared (IrDA) port
- Built-in 56Kbps Modem
- 10/100BASE-T Ethernet

**Graphics, Video & Sound**
- 2MB SGRAM (exp. to 6MB)
- Built-in 15" color display with 13.8" viewable image size and .28mm dot pitch
- Stereo speakers for Simulated Surround Sound (SRS)
- 16-bit stereo quality audio input

**Also Includes**
- USB keyboard and mouse
- Mac OS 8.1, Microsoft® Internet Explorer with Outlook Express, Quicken Deluxe 98, AppleWorks, FAXstf BE, Kai's Photo Soap, Williams-Sonoma Cookbook, Earthlink Total Access 2.01 and more!

**See next four pages for Hot New iMac USB peripherals!**

**Plus, you get ALL these titles with your iMac!**



*Most software comes pre-installed. Call for details.*

**FREE 32MB RAM**
(a $75.00 value)
**with NEW Apple® iMac™**
**only**
**$1,299** #34188
Exclusive Low lease rate. Only $39.00/Month!
$30 installation fee applies.

*The 15" shadow-mask monitor features quick refresh rates—117MHz at standard resolution—to reduce flicker.*

*The iMac is totable! A convenient handle lets the 40lb. unit be easily moved.*

*The keyboard offers two USB ports (one for the mouse) and a USB hub to allow daisy-chained devices.*



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233MHz

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*Features a high quality display—up to 14.1" diagonal.*

**Apple® Macintosh® PowerBook™ G3**
**Starting at**
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*Storage will never be an issue with up to 8GB hard drive space!*

**up to 292MHz**

# The New G3 PowerBooks... Out-Perform Desktop Systems!

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## Stellar Features at an Affordable Price!

**Processor and Memory**
- 233, 250, or 292MHz PowerPC G3 processor–fastest performance ever in a notebook!
- 1MB Backside Level 2 Cache on the 250 and 292MHz processor modules
- 125MHz (250MHz Model) or 146MHz (292MHz Model) dedicated backside bus
- 66MHz (233MHz Models) or 83MHz (250 & 292MHz Models) system bus speed
- Integrated floating point unit and 64K on-chip Level 1 cache (32K for data and 32K for instruction)
- 32 or 64MB RAM; 2 SO-DIMM slots support up to 192MB RAM; 4MB ROM

**Storage**
- 2, 4 or 8GB IDE hard drive
- 20X CD-ROM drive for use in expansion bay
- Removable 1.44MB floppy disk drive for use in expansion bay (sold separately in #34251)

**Expansion & Networking Ports**
- Two hot-swappable expansion bays
- ADB port, SCSI port, Serial port
- Built-in 10BASE-T Ethernet
- RJ-11 modem port, 4Mbps Infrared (IrDA) port
- PC Card Slots for two Type II or one Type III PC Card

**Graphics, Video & Sound**
- Features high-quality display, up to 14.1 inches diagonal
- 12.1 inch diagonal display features SVGA STN passive matrix display with support for thousands of colors at 800 x 600 pixel resolution
- 13.3 and 14.1 inch diagonal displays feature built-in TFT XGA active matrix displays, supporting millions of colors at 1,024 x 768 pixel resolution
- 2 or 4MB SGRAM video memory
- 2D/3D graphics, through integrated video controller
- S-video output for connecting to a TV (13.3" & 14.1" displays only)
- 16-bit CD quality stereo input/output
- Two built-in stereo speakers

**Portability**
- Includes one lithium-ion battery for up to 3.5 hours of normal use; supports two batteries for as much as 7 hours of use

**Software**
- Mac OS 8.1, which includes Internet access software, FAXstf, Now Contact & Up-to-Date and WebWhacker

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## Why a G3?

### Designed to be as attractive as it is functional!

Sleek ergonomics for more efficiency

Flip up keyboard gives easy access to RAM expansion slot & removable hard disk drive

New, more flexible configuration options!



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| Order | Speed | RAM | HD | CD-ROM | Floppy | Modem | Display | Weight | Only | Or Lease |
|---|---|---|---|---|---|---|---|---|---|---|
| #34251 | 233MHz | 32MB | 2GB | 20X | — | — | 12.1" Passive Matrix | 7.2lbs. | $2,299 | $92/mo |
| #34252 | 233MHz | 32MB | 2GB | 20X | Included | 56K | 12.1" Passive Matrix | 7.2lbs. | $2,579 | $104/mo |
| #34253 | 233MHz | 32MB | 2GB | 20X | Included | — | 13.3" Active Matrix | 7.6lbs. | $2,999 | $120/mo |
| #34255 | 233MHz | 32MB | 2GB | 20X | Included | — | 14.1" Active Matrix | 7.8lbs. | $3,499 | $140/mo |
| #34286 | 250MHz | 32MB | 4GB | 20X | Included | 56K | 13.3" Active Matrix | 7.6lbs. | $3,899 | $156/mo |
| #34287 | 292MHz | 64MB | 8GB | 20X | Included | 56K | 14.1" Active Matrix | 7.8lbs. | $5,599 | $224/mo |

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### PowerBook G3 Accessories

*Make your PowerBook G3 totally portable with these name-brand accessories!*



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|---|---|---|
| #31413 | Apple AC Adapter | $74.99 |
| #31414 | Apple Floppy disk drive | $99.99 |
| #31873 | VST Charger for PowerBook G3 | $149.99 |
| #31412 | Apple Lithium-ion battery | $199.99 |
| #33200 | IX Micro Road Rocket 128-bit Video card for PB G3 | $289.99 |
| #34062 | Apple DVD-Video Kit | $499.99 |

### Internal Zip® for Your PowerBook!

*Faster than desktop Zip drives—no cables or batteries required!*

$239.99



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*The best way to connect your Macintosh PowerBook—in and out of the office!*



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# New Power Mac CPU




## Apple® Power Mac™ G3 Desktops Starting at $1,399!

#32510
Or Lease for $56 per month

Three standard 12" PCI slots for easy expansion of system functionality.

Monitor sold separately on all models.

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# Next Generation Power Mac G3... for Performance & Expandability!

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- 233, 266, 300, 333 or 366MHz PowerPC G3 processor
- 512K or 1MB Backside Level 2 Cache
- 117, 133 or 150MHz dedicated 64-bit backside bus
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- 32, 64 or 128MB SDRAM (3 DIMM Slots support up to 192MB Desktop models or 384MB Mini-Tower models
- 64-bit memory bus

**Storage**
- 4 or 6GB IDE or SCSI hard drive
- 24X CD-ROM drive
- 1.44MB Floppy Disk Drive
- Iomega Zip 100MB SCSI Drive (select models)

**Expansion Options**
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- One or two 5.25" SCSI expansion bay

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- Mac OS 8.0

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**New, more flexible configuration options!**



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Includes PhotoDeluxe

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| #13938 | 64MB DIMM (60ns) | $119.99 |

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| #93963 | 32MB DIMM (60ns) | $49.99 |
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| #26311 | 32MB DIMM (60ns) | $75.99 |
| #26312 | 48MB DIMM (60ns) | $115.99 |
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| #97312 | 16MB DIMM (60ns) | $35.99 |
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| #90680 | 64MB EDO DIMM | $169.99 |

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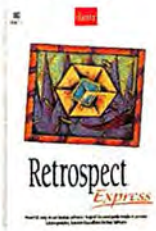

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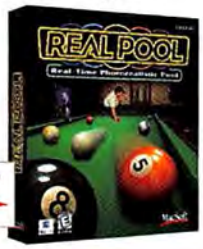

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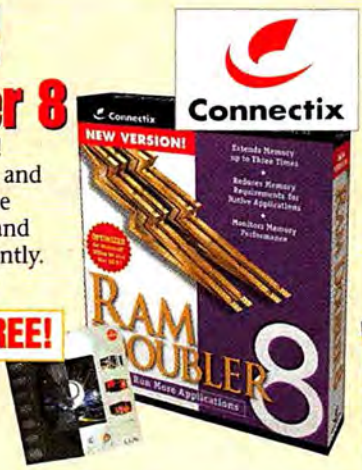

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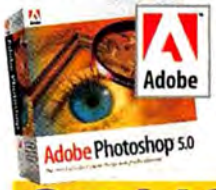


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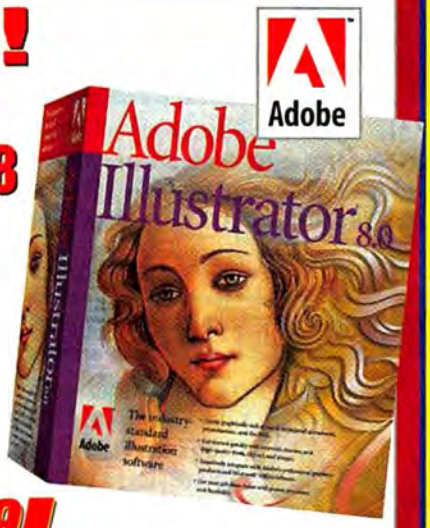
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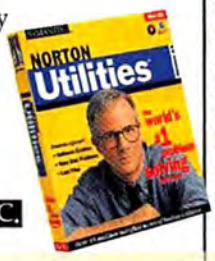
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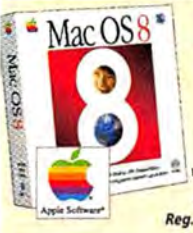

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•233MHz PowerPC™ G3 processor •32MB SGRAM •4GB hard drive •24X CD-ROM •Built-in 15" monitor (13.8" VIS) •2MB VRAM •56Kbps V.90 modem •Cable modem ready
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Iomega 2GB Jaz Cartridge 3-pack (formatted) (BER MAC2GIGTRI) ... $299.99




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PowerSTOR

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| 4.3 GB | (DCAS34330S) | $275 | $335 |
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9.9ms Seek 512K Buffer 5400 RPM 5Year Warranty

**STRATUS 3.2GB** $205 INTERNAL $255 EXTERNAL

**Quantum**

| | INTERNAL | EXTERNAL |
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9ms Seek 512K Buffer 5400 RPM 5Year Warranty

**Seagate ELITE** Awesome Capacity!

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IN STOCK TODAY
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| 8 GB | Sony 7000 | 90 MB/Min. | 975 |
| 24 GB | HP1554 DDS3 | 120 MB/Min. | 1395 |
| 24 GB | Sony 9000 DD3 | 120 MB/Min. | 1245 |
| 30 GB | DLT™ 2000XT | 150 MB/Min. | 2275 |
| 40 GB | DLT™ 4000 | 180 MB/Min. | 2885 |
| 48 GB | HP1553 DDS2 | 60 MB/Min. | 2485 |
| 50 GB | Sony AIT50X 300G 8mm | 360 MB/Min. | 2989 |
| 70 GB | DLT™ 7000 | 600 MB/Min. | 6295 |
| 144 GB | HP1559 DDS3 | 120 MB/Min. | 3345 |
| 150 GB | DLT™ 2500XT | 150 MB/Min. | 4895 |
| 210 GB | DLT™2700XT | 150 MB/Min. | 6535 |
| 200 GB | DLT™ 4500 | 180 MB/Min. | 5595 |
| 280 GB | DLT™4700 | 180 MB/Min. | 7695 |

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## HARD DRIVES

### Quantum

Quantum Stratus drives carry a 3 Year Warranty
Quantum Atlas & Viking drives carry a 5 Year Warranty

| Description | Model | Access | RPM | Bare | Ext |
|---|---|---|---|---|---|
| **Ultra SCSI-3** | | | | | |
| 2.1GB Stratus SE | QM32160SES | 10ms | 5400 | $209 | $279 |
| 3.2GB Stratus SE | QM33240SES | 10ms | 5400 | $239 | $309 |
| 4.3GB Stratus SE | QM34320SES | 10ms | 5400 | $279 | $349 |
| 4.5GB Viking | QM34550VKS | 8ms | 7200 | $199 | $269 |
| 6.4GB Stratus SE | QM36480SES | 10ms | 5400 | $359 | $429 |
| 8.4GB Stratus SE | QM38420SES | 10ms | 5400 | $479 | $549 |
| 9.1GB Atlas III | QM309100TDS | 7.8ms | 7200 | $729 | $799 |
| 18.2GB Atlas III | QM318200TDS | 7.8ms | 7200 | $1249 | $1319 |
| **UltraWide SCSI-3** | | | | | |
| 4.5GB Viking* | QM34550VKSC | 8ms | 7200 | $199 | $289 |
| 9.1GB Atlas III | QM309100TDLW | 7.8ms | 7200 | $779 | $869 |
| 18.2GB Atlas III | QM318200TDLW | 7.8ms | 7200 | $1359 | $1449 |
| **IDE Drives** | | | | | |
| 2.5GB Fireball EL | QM302500ELA | 10ms | 5400 | $139 | ---- |
| 5.1GB Fireball EL | QM305100ELA | 10ms | 5400 | $169 | ---- |
| 7.6GB Fireball EL | QM307500ELA | 10ms | 5400 | $259 | ---- |
| 10.2GB Fireball EL | QM310200ELA | 10ms | 5400 | $339 | ---- |

*80 pin SCA drive with 68 pin adapter

### Seagate

Barracuda & Cheetah drives carry a 5 Year Warranty
Medalist drives carry a 3 Year Warranty

| | | | | | |
|---|---|---|---|---|---|
| **Ultra SCSI-3** | | | | | |
| 4.5GB Medalist Pro | ST34520N | 9.5ms | 7200 | $299 | $369 |
| 6.5GB Medalist Pro | ST36530N | 9.5ms | 7200 | $399 | $469 |
| 4.5GB Medalist Pro | ST39140N | 9.5ms | 7200 | $529 | $599 |
| 9.1GB Barracuda 9LP | ST39173N | 7.1ms | 7200 | $649 | $719 |
| 9.1GB Cheetah | ST19101N | 7.7ms | 10000 | $799 | $869 |
| 18.2GB Barracuda 18 | ST118273N | 7.1ms | 7200 | $1199 | $1269 |
| **UltraWide SCSI-3** | | | | | |
| 9.1GB Barracuda 9LP | ST39173W | 7.1ms | 7200 | $649 | $739 |
| 9.1GB Cheetah 9LP | ST39102LW | 12.2ms | 10000 | $799 | $889 |
| 18.2GB Barracuda 18 | ST118273W | 7.1ms | 7200 | $1199 | $1289 |
| 18.2GB Cheetah 18 | ST118202LW | 12.2ms | 10000 | $1429 | $1519 |

### IBM

IBM drives carry a 5 Year Warranty

| | | | | | |
|---|---|---|---|---|---|
| **UltraWide SCSI-3** | | | | | |
| 9.1GB UltraStar 9ES | 00K3990 | 7.5ms | 7200 | $599 | $689 |
| 9.1GB UltraStar 9ZX | 59H6590 | 6.5ms | 1000 | $639 | $729 |
| 18.2GB UltraStar 18XP | 59H6591 | 6.5ms | 7200 | $1199 | $1289 |

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### INTERNAL HARD DRIVE KITS

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12-24GB
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| G3 250MHz w/13.3" TFT | 32MB, 4GB IDE, 20X, 10BT, 56K, S-Video, 1.44MB | $3669 |
| G3 233MHz w/14.1" TFT | 32MB, 2GB IDE, 20X, 10BT, S-Video, 1.44MB | $3289 |
| G3 292MHz w/14.1" TFT | 64MB, 8GB IDE, 20X, 10BT, 56K, S-Video, 1.44MB | $5269 |

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|---|---|---|
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| | | | | | Int | Ext |
|---|---|---|---|---|---|---|
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| 3228MB | 5400rpm | 512K | FB33200S | 3yr | $235 | $295 |
| 4310MB | 5400rpm | 512K | FB34300S | 3yr | $269 | $329 |
| 6448MB | 5400rpm | 512K | FB36400S | 3yr | $350 | $410 |
| 8455MB | 5400rpm | 512K | FB38400S | 3yr | $455 | $515 |
| 9100MB | 7200rpm | 1024K | XP309100S | 5yr | $669 | $729 |
| 18200MB | 7200rpm | 1024K | XP318200S | 5yr | $1139 | $1199 |

## ULTRA WIDE SCSI

| | | | | | | |
|---|---|---|---|---|---|---|
| 4550MB | 7200rpm | 512K | VK304550W | 5yr | $305 | $395 |
| 9100MB | 7200rpm | 512K | VK309100W | 5yr | $509 | $599 |

## ULTRA 2 SCSI

| | | | | | | |
|---|---|---|---|---|---|---|
| 4550MB | 7200rpm | 512K | VK304550LW | 5yr | $325 | $425 |
| 9100MB | 7200rpm | 512K | VK309100LW | 5yr | $539 | $639 |
| 9100MB | 7200rpm | 1024K | XP309100LW | 5yr | $669 | $769 |
| 18200MB | 7200rpm | 1024K | XP318200LW | 5yr | $1139 | $1239 |

**MegaHaus is the first company to sell the new Quantum approved Audio Visual ready drives.**

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| | | | | | | |
|---|---|---|---|---|---|---|
| 4550MB | 7200rpm | 512K | VK304550LV4 | 5yr | $355 | $455 |
| 9100MB | 7200rpm | 512K | VK309100LV4 | 5yr | $569 | $669 |
| 18200MB | 7200rpm | 1024K | XP318200LV4 | 5yr | $1169 | $1269 |

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| 20GB | 40GB | $2479 DLT4000 | $2729 DLT4000QX | n/a |
| 35GB | 70GB | $5569 DLT7000 | $5956 DLT7000QX | n/a |
| 75GB | 150GB | n/a | $4349 DLT2500XT | $4229 DLT2500XTR |
| 100GB | 200GB | n/a | $5399 DLT4500 | $5169 DLT4500R |
| 140GB | 280GB | n/a | $7279 DLT4700 | $7029 DLT4700R |

*Drive must be purchased at these advertised prices to receive Omaha Steaks certificate. Table top and rack mount are in Quantum enclosures. These special prices do not include media, backup software, or cable. We offer these accessories at discounted prices with drive purchase. Certificate offer is valid on drives purchased July 15, 1998 thru September 30, 1998.

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|---|---|---|
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| 4x8 Matsushita (Panasonic) mechanism, tray load, 1MB buffer | **$309** | **$369** |
| 4x12 Teac mechanism, tray load, 1MB buffer | $459 | $519 |
| 4x12 Plextor mechanism, caddy/tray load, 2MB buffer | $449 | $509 |
| **NEW** 8x20 tray load, 2MB buffer | $909 | $969 |
| **CD REWRITABLE** Includes 5 Free ReWritable Disks! | | |
| 2x6 Philips mechanism, tray load, 1MB buffer | $369 | $419 |
| 2x6 Ricoh mechanism, tray load, 1MB buffer | $409 | $469 |
| 2x6 Ricoh mechanism, caddy load, 2MB buffer | $459 | $519 |
| 2x4x6 Yamaha mechanism, tray load, 2MB buffer | $439 | $499 |

| Adaptec Jam Pro Audio Software w/ Peak LE $289 | Adaptec Bias Peak Software $499 | Fargo Signature CD Printer $999 | CD Duplicators Call for price. | CDStomper label kit $59 |
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Syjet 1.5GB (DUOSYJETM) $350

**All-in-one CD Mastering**



## • SCSI HARD DRIVES •

### Seagate

| | | | | | Internal | External |
|---|---|---|---|---|---|---|
| 4520MB | 7200rpm | 512K | ST34520N | 3yr | $280 | $340 |
| 4550MB | 7200rpm | 512K | ST34573N | 5yr | $489 | $549 |
| 6530MB | 7200rpm | 512K | ST36530N | 3yr | $399 | $459 |
| 9140MB | 7200rpm | 512K | ST39140N | 3yr | $515 | $565 |
| 9190MB | 7200rpm | 1024K | ST39173N | 5yr | $619 | $679 |
| 18200MB | 7200rpm | 1024K | ST118273N | 5yr | $1139 | $1199 |
| ULTRA WIDE SCSI | | | | | | |
| 4520MB | 7200rpm | 512K | ST34520W | 3yr | $280 | $370 |
| 4550MB | 7200rpm | 512K | ST34573W | 5yr | $489 | $579 |
| 6530MB | 7200rpm | 512K | ST36530W | 3yr | $399 | $489 |
| 9140MB | 7200rpm | 512K | ST39140W | 3yr | $515 | $595 |
| 9190MB | 7200rpm | 1024K | ST39173W | 5yr | $619 | $709 |
| 18200MB | 7200rpm | 1024K | ST118273W | 5yr | $1139 | $1229 |
| ULTRA 2 SCSI | | | | | | |
| 4550MB | 7200rpm | 1024K | ST34573LW | 5yr | $519 | $629 |
| 4550MB | 10,000rpm | 1024K | ST34502LW | 5yr | $539 | $649 |
| 9100MB | 10,000rpm | 1024K | ST39102LW | 5yr | $759 | $869 |
| 9190MB | 10,000rpm | 1024K | ST39173LW | 5yr | $645 | $755 |
| 18200MB | 7200rpm | 1024K | ST118273LW | 5yr | $1159 | $1269 |
| 18200MB | 10,000rpm | 1024K | ST118202LW | 5yr | $1369 | $1479 |

### IBM

| | | | | | | |
|---|---|---|---|---|---|---|
| 4550MB | 5400rpm | 512K | IBM34330N | 5yr | $249 | $309 |
| 9100MB | 7200rpm | 512K | IBM39130N | 5yr | $549 | $609 |
| 18200MB | 7200rpm | 1MB | IDGHS18Z | 5yr | $1279 | $1339 |
| ULTRA WIDE SCSI | | | | | | |
| 4550MB | 5400rpm | 512K | IBM34330W | 5yr | $259 | $349 |
| 9100MB | 7200rpm | 512K | IBM39130W | 5yr | $569 | $659 |
| 9100MB | 10020rpm | 1MB | IDVGS9U | 5yr | $779 | $869 |
| 18200MB | 7200rpm | 1MB | IDGHS18U | 5yr | $1159 | $1249 |
| ULTRA-2 SCSI | | | | | | |
| 9100MB | 7200rpm | 512K | IBM39130U2 | 5yr | $589 | $699 |
| 18200MB | 7200rpm | 1MB | IDGHS18U2 | 5yr | $1179 | $1289 |

### FUJITSU

**Check out these prices! Also NEW 10,000rpm Drives.**

| | | | | | | |
|---|---|---|---|---|---|---|
| ULTRA WIDE SCSI | | | | | | |
| 4550MB | 7200rpm | 512K | M3045W | 5yr | $319 | $409 |
| 4550MB | 10,000rpm | 512K | M3045WP | 5yr | $409 | $499 |
| 9100MB | 7200rpm | 512K | M3091W | 5yr | $529 | $619 |
| 9100MB | 10,000rpm | 512K | M3091WP | 5yr | $679 | $769 |
| 18200MB | 7200rpm | 512K | M3182SW | 5yr | $1039 | $1129 |

## • CD ROM DRIVES •

| | | | Internal | External |
|---|---|---|---|---|
| 16X- 5 disc changer | Nakamichi | MJS16M/XM | $189 | $249 |
| 24X - Tray load | NEC | CDR1810M/XM | $87 | $147 |
| 32X - Slot load | Pioneer | DRX32SM/XM | $95 | $155 |
| 32X - Tray load | Toshiba | XM6201BM/XM | $105 | $165 |
| 32X - 512K buffer | Plextor | PX32TSM/XM | $148 | $208 |

## • MISCELLANEOUS •

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|---|---|---|
| **IOMEGA 1GB Jaz** | JAZX | $269 |
| **IOMEGA 2GB Jaz** | JAZ2X | $339 |
| **SYQUEST 1.5GB** Ask about rebate | SYJET1.5MAC | $279 |
| **ADAPTEC Controllers** | | |
| PCI Wide Single Channel | A2940MUW | $269 |
| PCI Wide Dual Channel | A3940MUW | $529 |
| PCI FireWire + Wide SCSI | AHA8945 | $639 |
| PCI Ultra 2 | A2940MU2W | $399 |
| **ATTO Controllers** | | |
| PCI Fibre Channel | ATTOPCIFC | $889 |
| PCI Ultra 2 SCSI | ATTOPCIU2 | $469 |
| above w/ RAID software & cable | ATTOPCIU2K | $669 |
| **Cool DVD Kit** | | |
| Complete kit for Mac G3 computers | DVDMAC | **$399** |
| **Maxoptix Optical Drives** | | |
| 2.6GB | T5-2600 | $1149 |
| 5.2GB | T6-5200 | $1499 |
| **Sony Optical Drives** | | |
| 5.2GB | SMOF551 | $1599 |
| **Fujitsu Optical Drives** | | |
| 640MB (mail in offer for 3 disks until 9/30/98) | DYNAMO640SE | $329 |

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| | CDR74 | CDR74W | CDR74P |
|---|---|---|---|
| 5 Pack | $21/$19 | $89/$84 | $28/$25 |
| 20 Pack | $42/$39 | $340/$335 | $65/$62 |
| 50 Pack | $93/$89 | $799/$789 | $139/$135 |
| 100 Pack | $175/$169 | $1500/$1480 | $259/$249 |
| Budget 5 Pack | $19/$17 | $80/$76 | $24/$21 |
| Budget 20 Pack | $36/$33 | $299/$289 | $55/$52 |
| Budget 50 Pack | $74/$70 | $699/$689 | $119/$109 |
| Budget 100 Pack | $139/$129 | $1299/$1289 | $230/$220 |

CDR74 is recordable, CDR74W is rewritable, CDR74P is printable. $ is alone/with CDR purchase. 8X certified, & Platinum now available.

## • IDE HARD DRIVES •

| | | | | | |
|---|---|---|---|---|---|
| 3.5" ULTRA IDE | | | | | |
| 6530MB | Seagate | 7200rpm | ST36530A | 3yr | $209 |
| 9140MB | Seagate | 7200rpm | ST39140A | 3yr | $299 |
| 10100MB | IBM | 5400rpm | IBM10GP | 3yr | $309 |
| 10100MB | IBM | 7200rpm | IBM10GXP | 3yr | $339 |
| 12900MB | IBM | 5400rpm | IBM12GP | 3yr | $399 |
| 14400MB | IBM | 7200rpm | IBM14GXP | 3yr | $519 |
| 16800MB | IBM | 5400rpm | IBM16GP | 3yr | $459 |
| 2.5" IDE for laptops | | | | | |
| 4000MB | Toshiba | 12.1mm | MK4006MAV | 1yr | $339 |
| 5000MB | Hitachi | 12.7mm | DK228A50 | 3yr | $445 |
| 5400MB | IBM | 12.5mm | DA25400 | 3yr | $555 |
| 6480MB | IBM | 12.5mm | DA2640 | 3yr | $695 |
| 6490MB | Toshiba | 12.7mm | MK6409MAV | 1yr | $589 |

## RAID



These preconfigured RAIDs can be run in RAID 0 or 1 mode. The capacity listed is for RAID 0 configuration. In RAID 0, the data is striped across a pair of drives. This is perfect for digital video such as Media 100, TrueVision, Avid, or other applications that require extremely high data transfer rates.

Includes - Ultra 2 LVD SCSI drives - Adaptec PCI Ultra-2 SCSI controller - Adaptec Remus Lite RAID software - Necessary cables

| | | | | Removable | Fixed |
|---|---|---|---|---|---|
| 18GB | 7,200rpm | 2 | 9.1GB Quantum Viking drives | $1969 | $1769 |
| 18GB | 7,200rpm | 2 | 9.1GB Quantum Atlas drives | $2229 | $2029 |
| 18GB | 7,200rpm | 2 | 9.1GB Seagate Barracuda drives | $2189 | $1989 |
| 18GB | 10,000rpm | 2 | 9.1GB Seagate Cheetah drives | $2449 | $2249 |
| 36GB | 7,200rpm | 2 | 18GB Quantum Atlas drives | $3229 | $3029 |
| 36GB | 7,200rpm | 2 | 18GB Seagate Barracuda drives | $3259 | $3059 |
| 36GB | 10,000rpm | 2 | 18GB Seagate Cheetah drives | $3799 | $3599 |

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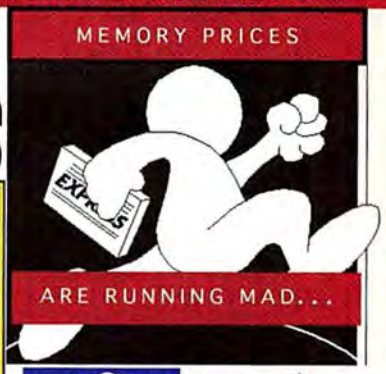
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| 32MB | $69 | 32MB | $94 | 64MB | $128 |
| 16MB | $51 | 16MB | $80 | 32MB | $72 |
| **PB 2400 Series** | | **PB2300 Series** | | **PB 500 Series** | |
| 64MB | $154 | 48MB | $134 | 32MB | $92 |
| 32MB | $93 | 36MB | $125 | 16MB | $49 |
| 24MB | $80 | 32MB | $120 | 8MB | $45 |
| 16MB | $59 | 20MB | $115 | 4MB | $40 |
| **PB1400 Series** | | **PB DUO Series** | | **PB 5300 Series** | |
| 48MB | $149 | 36MB | $212 | 48MB | $139 |
| 32MB | $88 | 28MB | $114 | 32MB | $93 |
| 16MB | $59 | 20MB | $98 | 16MB | $49 |
| 8MB | $49 | 14MB | $85 | 8MB | $55 |

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| 64MB | $99 | 64MB | $95 | 32MB | $45 |
| 32MB | $52 | 32MB | $48 | 16MB | $35 |
| 16MB | $42 | 16MB | $39 | | |
| **3.3v EDO Simms** | | **72-Pin Simms** | | **30-Pin Simms** | |
| 64MB | $93 | 32MB | $42 | 16MB | $46 |
| 32MB | $45 | 16MB | $22 | 4MB | $14 |
| 16MB | $35 | 8MB | $14 | 2MB | $10 |




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| Q 6.4GB (Ext) 5400RPM | $488 |
| LaCie 24X Ext CD-Rom Drive | $137 |
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| LaCie 32x Ext CD-Rom Drive | $166 |

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| G3/233 32/2GB/13.3 TFT/20X CD-ROM/S VIDEO | $2999 |
| G3/233 32/4GB/14.1 TFT/20X CD-ROM/ENET/S VIDEO | $3499 |
| G3/250 32/4GB/13.3 TFT/20X CD-ROM/ENET/56K | $3899 |
| G3/292 64/8GB/14.1 TFT/20X CD-ROM/ENET/56K | $5599 |

## POWER MACINTOSH G3

| | |
|---|---|
| G3/233 Desktop 32/4GB/24X CD-ROM | $1699 |
| G3/266 Desktop 32/4GB/24X CD-ROM/Zip drive | $1999 |
| G3/266 Mini-Tower 32/6GB/24X CD-ROM/Zip drive | $2499 |
| G3/300 Mini-Tower 64/4GB/24X CD-ROM/6MB SGRAM | $3359 |
| G3/300 Mini-Tower 128/2X4GB/24X CD-ROM/6MB SGRAM | $4599 |

## AND FOR YOUR G3 POWERBOOKS

| | |
|---|---|
| VST Zip Drive for G3 | $238 |
| DVD-ROM Expansion Bay Module | $435 |
| Floppy Disk Drive Expansion Bay Module | $102 |

## PRINTERS & SCANNERS

UMAX




$199

| | |
|---|---|
| Astra 610s | $148 |
| Astra 1200 32Bit 600dpi | $249 |
| Trans. Adptr Astra 1200 | $198 |
| Trans. Adptr Astra 1220 | $180 |

HEWLETT PACKARD

| | |
|---|---|
| Laserjet 4000 17PPM | $1139 |
| Laserjet 8000 24PPM | $2463 |

EPSON $225

Stylus 600 Inkjet




| | |
|---|---|
| Stylus 800 Inkjet | $308 |
| Expression 636 Exec. | $805 |
| Expression 636 Pro | $1409 |
| Stylus Color 1520 | $806 |
| Stylus Color 3000 | $1814 |
| Stylus Photo EX | $506 |

## MONITORS



ViewSonic

| | |
|---|---|
| VS E655 15" | $225 |
| VS GS771 17" | $389 |
| VS GS773 17" | $485 |
| VS G800 20" | $1032 |

SONY

| | |
|---|---|
| CPD 100ES 15" | $288 |
| CPD 200GES 17" | $649 |
| GDM 20SE2T 20" | $1260 |

ViewSonic GS773 $568

NEC

| | |
|---|---|
| NEC LCD2000 20" | $6178 |
| NEC M500 15" | $389 |
| NEC E500 15" | $288 |
| NEC M700 17" | $598 |

## newertech

Add G3 Power with the NEW Maxpowr & Nupowr Series

| | |
|---|---|
| *For the PowerMac 6100 Series* | |
| Maxpowr G3 210MHz/512K Cache | $496 |
| Maxpowr G3 240MHz/1MB Cache | $680 |
| *For the PowerMac 7100/8100 Series* | |
| Maxpowr G3 210MHz/512K Cache | $580 |
| Maxpowr G3 240MHz/1MB Cache | $778 |
| *For the PowerBooks.....* | |
| PB1400 Nupowr 216MHz / 512k | $675 |
| PB1400 Nupowr 250MHz / 1 MB | $970 |
| PB2400 Nupowr 240MHz / 512k | $822 |

## MEDIA

SONY

| | |
|---|---|
| CDR 650MB 74min disks - 10pk | $21 |
| 128MB 3.5" M/O disks - 3 pack | $25 |
| 230MB 3.5" M/O disks - 3 pack | $38 |
| 600MB/512 b/s 5.25" M/O disk | $39 |
| 1.2GB/512 b/s 5.25" M/O disk | $39 |
| DDS 4mm 2GB Data cartridge | $8 |
| DDS 4mm 4GB Data cartridge | $16 |

VERBATIM

| | |
|---|---|
| 230MB 3.5"color M/O disks - 3pk | $31 |
| 1.2GB/512 b/s 5.25" M/O disk | $42 |
| 1.3GB/1024 b/s 5.25" M/O disk | $42 |
| 2.3GB/512 b/s 5.25" r/w M/O disk | $59 |
| 2.6GB/1024 b/s 5.25" r/w M/O disk | $59 |
| 4mm 60m/1.3GB DL cartridge | $5.99 |
| 4mm 90m/2GB DL cartridge | $6.50 |

## Jaz2 Drive + 1 Free Disk From IOMEGA

$489



| | |
|---|---|
| Zip Drive w/Disk | $134 |
| Zip PLus w/Disk | $199 |
| ZIP 100 Disk | $13 |
| ZIP 100 Disks - 3-pk | $36 |
| ZIP 100 Disks - 10-pk | $113 |
| Jaz 1GB Disk | $89 |
| Jaz 1GB Disks - 5-pk | $418 |
| Jaz 1GB Disks - 20-pk | $1641 |

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mactell
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G3 266/1MB .....$799
G3 300/512k .....$799
*G3 300/1MB.....$1599*



Yamaha External CDR Drives In Yamaha Case
*Yamaha CDR 4x/6x Drive..$379*
Yamaha CDR 4x/6x w/Toast $449
ReRecordable 2x/4x/6x .....$399
ReRecordable 2x/4x/6x Tst ..$469

IBM
16GB IDE Internal Drive $519.99

RAILGUN from Bottomline
$689
G3 250/1MB
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http://www.xlr8yourmac.com/

## Bottom Line Slams The Competition!

### 64MB
64MB 164-Pin DIMMs
Lifetime Warranty From Bottom Line

| | |
|---|---|
| MacMall | $85.99 |
| MacWarehouse | $299 |
| MacConnection | $149 |
| LLB Company | $90 |
| **Bottom Line's Low Price** | **$67.99** |

### Panasonic
4x/8x CD-R Recordable Drive Internal
External w/Toast and Cable $369.99!!

| | |
|---|---|
| MacMall 4x/4x | $699 |
| MacWarehouse | $599 |
| MacCon 4x/12x | $425 |
| MacZone 4x/12x | $499 |
| **Bottom Line's Low Price** | **$259** |

### ATI Xclaim 3D 4MB

| | |
|---|---|
| MacMall | $199 |
| LLB Company | $175 |
| MacConnection | $179 |
| CDW | $179 |
| **Bottom Line's Low Price** | **$159** |

4MB Upgrade...$39

### 128MB
128MB SDRAM DIMMs
For G3 Apple© PowerMac Systems
Lifetime Warranty From Bottom Line

| | |
|---|---|
| MacMall | $309 |
| MacZone | $249 |
| Cyberian | $329 |
| ClubMac | $215 |
| **Bottom Line's Low Price** | **$179** |

### Seagate
Cheetah 10,000 PRM LVD Drive 9.1GB
$789

| | |
|---|---|
| Cyberian | $1079 |
| MacWarehouse | $919 |
| MacConnection | $879 |
| MacMall | $999 |
| *Barracuda 9.1GB 7200rpm $695.99* | |

### POWERLOGIX
G3 220Mhz/512k
Lowest Priced G3 Card On The Market

| | |
|---|---|
| Cyberian | $499 |
| MacGurus | $448 |
| SmalDog | $459 |
| **Bottom Line's Low Price** | **$447** |

### Kodak DC-260 1.6Million MEGAPIXEL Digital Camera

| | |
|---|---|
| MacMall | $999 |
| MacWarehouse | $919 |
| MacConnection | $999 |
| ClubMac | $999 |
| **Bottom Line's Low Price** | **$889** |

### UMAX Astra 610s Scanner

| | |
|---|---|
| LLB Company | $148 |
| MacConnection | $149 |
| Cyberian | $119 |
| CDW | $119 |
| **Bottom Line's Low Price** | **$95*** |

*$20.00 rebate until 8/31/98

## G3 Processor Card Upgrades

### RAILGUN from Bottomline

| | |
|---|---|
| RailGun G3 275/125Mhz 512k | $499 |
| RailGun G3 250/167Mhz 1MB | $689 |
| RailGun G3 300/150Mhz 512k | $799 |
| RailGun G3 300/200Mhz 1MB | $999 |
| RailGun G3 300/300Mhz 1MB | $1629 |

### newertechnology

| | |
|---|---|
| MAXpowr G3 220/110Mhz 512k | $619 |
| MAXpowr G3 250/125Mhz 512k | $729 |
| MAXpowr G3 300/150Mhz 1MB | $1229 |
| MAXpowr G3 300/300Mhz 1MB | $1929 |
| MAXpowr G3 6100 210Mhz | $499 |
| MAXpowr G3 71/8100 210Mz | $599 |

### XLR8

| | |
|---|---|
| XLR8 G3 220/110Mhz 512k | $439 |
| XLR8 G3 266/133Mhz 512k | $739 |
| XLR8 G3 266/167Mhz 1MB | $969 |
| XLR8 G3 275/183Mhz 1MB | $1199 |
| XLR8 G3 300/200Mhz 1MB | $1499 |

### POWERLOGIX
*The "Little Screamer":*
***PowerForce G3 220/110Mhz 512k $447***
PowerForce G3 300/110Mhz 512k $679
PowerForce G3 300/150Mhz 1MB$1099
PowerForce G3 300/300Mhz 1MB$1679

## Video/Display Cards 2D/3D

| | |
|---|---|
| IX Micro ProREZ 4MB | $289 |
| IX Micro UltimateREZ 8MB | $539 |
| ***IX Micro MacRocket 4MB ....$239*** | |
| MacTell Vision3D Lite 4MB | $279 |
| MacTell Vision3D Lite 8MB | $369 |
| Vision 3D Imagine II 8MB | $595 |
| Vision 3D Imagine III 8MB | $779 |
| ATI Nexus 2D/3D 8MB | $499 |
| ATI Xclaim 3D w/Rage 4MB | $159 |
| ATI Xclaim 3D w/Rage 8MB | $239 |

## Fast 7200/10,000rpm Hard Drives

| | |
|---|---|
| Quantum Atlas III 9GB | $599 |
| Quantum Atlas III 18GB | $1219 |
| Seagate Barracuda 9.1GB | $695 |
| Seagate Barracuda 18.2GB | $1285 |
| Seagate Cheetah LVD 9.1GB | $789 |
| IBM Ultrastar 9ES 4.55GB | $339 |
| IBM Ultrastar 9ES 9.1GB | $699 |
| IBM Ultrastar 9ZX 9.1GB | $839 |
| MAXTOR 10.2GB EIDE | $379 |
| **SCSI Cards:** | |
| Jackhammer Fast/Wide | $379 |
| ATTO Express PCI Fast/Wide | $269 |
| ATTO Ultra2 PCI LVD | $409 |
| Initio w/Conley RAID Softwr | $189 |

### XLR8 G3 233/512k Upgrade Card

| | |
|---|---|
| MacMall | $529 |
| ClubMac | $529 |
| **Bottom Line's Low Price** | **$439** |

### iomega Jaz 1GB Internal

| | |
|---|---|
| MacMall | $279 |
| MacWarehouse | $269 |
| MacZone | $279 |
| MacConnection | $279 |
| **Bottom Line's Low Price** | **$149** |

### ViewSonic GA 771

| | |
|---|---|
| MacZone | $464 |
| ClubMac | $499 |
| **Bottom Line's Low Price** | **$459** |

4MB Upgrade...$39

### radius MotoDV Digital Video Firewire Card
The New Standard In Video

| | |
|---|---|
| MacZone | $444 |
| Cyberian | $449 |
| ClubMac | $459 |
| **Bottom Line's Low Price** | **$429** |

### IBM Ultrastar 18XP 18GB Fast/Wide 7200rpm
$1299

| | |
|---|---|
| ClubMac | $1429 |
| MacWarehouse | $1399 |
| MacConnection | $1499 |
| *Ultrastar 9.1GB 7200rpm $599.99* | |

### Epson 600 InkJet Printer

| | |
|---|---|
| MacMall | $199 |
| MacConnection | $199 |
| MacZone | $199 |
| CDW | $199 |
| **Bottom Line's Low Price** | **$189** |

### MicroMat TechTool Pro v2.0 Diagnostic Software

| | |
|---|---|
| Cyberian | $89.95 |
| MacZone | $94.98 |
| MacMall | $94.99 |
| ClubMac | $99.99 |
| **Bottom Line's Low Price** | **$84.95** |

### USR/3COM 56k v90 Modem For Macintosh

| | |
|---|---|
| MacWarehouse | $149 |
| MacConnection | $149 |
| Cyberian | $159 |
| MacZone | $147 |
| **Bottom Line's Low Price** | **$139** |

## New Apple G3 System Pricing!

### Desktop Systems
$1399
DT 233Mhz 32/4GB/24xCD
$1799
DT 266Mhz 32/4GB/Zip/24xCD

### Mini-TowerSystems
$1989
G3 266Mhz 32MB RAM/4GB HD/Zip/24x/AV

| | |
|---|---|
| G3 MT 233/32/4G/56k/CD | $1599 |
| G3 MT 300/64/UW4G/CD | $2499 |
| G3 MT 300/128/2x4G/CD | $3299 |
| G3 MT 333/64/8GB/CD/AV | $2659 |
| G3 MT 366/128/UW4G/CD | $2989 |

## New Apple G3 PowerBooks Are Here!

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From:
$2279

| | |
|---|---|
| 233Mhz2GB/32/20x/12.1" | $2279 |
| 233Mhz 2GB/32/20x/12.1" | $2479 |
| 233Mhz 32/2GB/20x/13.3" | $2899 |
| 233Mhz 32/2GB/20x/14.1" | $3499 |
| 250Mhz 32/4GB/20x/13.1" | $3799 |
| 292Mhz 64/8GB/20x/14.1" | $5599 |

**"New" G3 PowerBook RAM:**

| | |
|---|---|
| 16MB Memory Module | $79.99 |
| 32MB Memory Module | $99.99 |
| 64MB Memory Module | $119.99 |
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- $3899 PowerPC 9600/350 w/ 24xCD
- $477 384MB RAM, Two 4GB HD F/W
- $118 Internal Zip, Apple keyboard
- $1089 Viewsonic 21" P810 monitor
- $199 ATI 8MB 3-D Rage PCI video card
- $1099 Microtek ScanMaker III/Trans/Photoshop
- $1979 GCC 800/20ppm 800dpi 13x20 Prnt & Enet
- $378 Jaz 2GB Drive with 1 cartridge
- $299 Wacom 12x12 Graphics Tablet
- $749 Sony SDT-7000 DAT Tape Backup

Zero Down! $319 per month

Lease Package Only $10287

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- $87 96MB RAM, 4GB HD
- $Free Apple keyboard
- $Free IOMega Zip 100 w/ 1 cart
- $Free Apple 15" AV monitor
- $129 Scanmaker V600 color scanner
- $29 6MB Video RAM
- $269 Epson Stylus Color 850 1440dpi
- $1779 GCC600/20 13x20, 600 dpi, 20ppm printer w/ Ethernet connectors
- $174 Wacom 6x8 Artz Graphics Tablet

### PM G3-266D Value DTP Station

Zero Down! $129 per month

Lease Package Only $4166

G3 300 starting at $2699!



- $2699 PowerPC G3 300 w/ 24xCD
- $477 384MB RAM, 4GB HD, 1MB Cache
- $Free Apple keyboard
- $376 External Jaz 2GB w/ 1 cart
- $595 ViewSonic V95 19"monitor
- $129 Scanmaker V600 color scanner
- $199 ATI 8MB PCI 3-D video card
- $1779 GCC600/20 13x20, 600 dpi, 20ppm printer w/ Ethernet connectors
- $295 Wacom 12x12 Graphics Tablet

### G3 300 MidRange DTP Station

Zero Down! $199 per month

Lease Package Only $6549

G3-266T starting at $1999!



### G3 266 Tower Real Time Video Capture System

60 Frames/Sec

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- $477 384MB RAM, 6GB HD
- $Free 1MB Cache
- $Free Extended keyboard
- $Free Internal Zip 100 w/ 1 cart
- $595 Viewsonic V95 19" monitor
- $199 ATI 8MB 3-D PCI video card
- $1650 Media 100qx Video Capture
- $999 Internal 18GB F/W Disk Array with Adaptec SCSI Controller/Remis SW
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Lease Package Only $6412

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G3 300 Tower starting at $2699!



### G3 300 Tower 3-D Video/Audio Workstation

- $2699 PowerPC G3 300 w/ 24xCD
- $477 384MB RAM, 4GB F/W HD, 1MB Cache
- $Free Extended keyboard, Int. Zip Drive
- $595 ViewSonic V95 19" 1600x1200 Monitor
- $Free ATI 8MB 3D Rage PCI Video
- $595 ScanMaker V600 color scanner
- $159 Teac 4x/12x CDR w toast SW
- $129 MicroMotion DC-30 Real-Time Video/Audio capture PCI card
- $399 $525

Zero Down! $159 per month

Lease Package Only $5221

### Lease System Specials

| System Description | Price | Lease | |
|---|---|---|---|
| PowerBook G3 233/32MB/2GB/20xCD/Enet/12.1 | $2099 | $66 | |
| PowerBook G3 233/32MB/2GB/20xCD/Enet/56K/13.3 | $2499 | $78 | |
| PowerBook G3 250/32MB/4GB/20xCD/Enet/56K/13.3 | $3299 | $103 | |
| PowerBook G3 292/64MB/8GB/20xCD/Enet/56K/14.1 | $4799 | $149 | |
| PowerMac G3 233/32MB/4GB/24xCD Desktop | $1439 | $46 | |
| PowerMac G3 233/32MB/4GB/24xCD/56K MiniTower | $1599 | $51 | |
| **PowerMac G3 266/32MB/4GB/24xCD/Desktop/15AV** | **$1599** | **$51** | SALE |
| PowerMac G3 266/32MB/6GB/24xCD/Zip/AV Tower | $1999 | $62 | |
| PowerMac G3 266/128MB/UW4GB/24xCD/8MB/100BT | $2999 | $94 | |
| PowerMac G3 300/64MB/4GB/24xCD/2MB | $2699 | $84 | New |
| PowerMac G3 300/128MB/2xUW4GB/24xCD/6MB/100BT | $3899 | $122 | |
| PowerMac 8600 300/32MB/4GB/24xCD/Zip | $1499 | $47 | |
| PowerMac 9600 300/64MB/4GB/24xCD/Zip/IMS 8MB | $1599 | $49 | |
| **PowerMac 9600 350/64MB/4GB/24xCD/Zip/IMS 8MB** | **$1999** | **$62** | SALE |

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### Memory



G3 128MB Only $159

64MB Dimm Only $89

| Size | 5vDIMMS | SIMMS | G3 Dimm |
|---|---|---|---|
| 4MB | N/A | $23 | N/A |
| 8MB | $25 | $25 | N/A |
| 16MB | $27 | $27 | $27 |
| 32MB | $48 | $39 | $41 |
| 64MB | $89 | $149 | $87 |
| SALE 128MB | $249 | NA | $159 |

Lifetime Warranty



JAZ 2GB Ext $279!

JAZ 1GB Ext $199!

JAZ2GB Carts $99

JAZ 1GB Carts $78

### Optical & CDR Drives

| | |
|---|---|
| **IOMega Jaz 1GB External** | **$199** SALE |
| IOMega Jaz2GB External | $279 |
| Ricoh 2x/2x/6x Rewrite CDR with Toast/cart | $499 |
| Jaz 1GB & 4x/12x CDR Toast/cart | $739 |
| Teac 4x/12xCDR with Toast/cart | $499 |

### Monitors

| | | |
|---|---|---|
| Sony 100ES 15", 1280x1024, .25mm | $269 | |
| ViewSonic E771, 1024x768, .28mm | $349 | |
| **ViewSonic EA 771AV, 1280x1024, .28mm** | **$469** | SALE |
| ViewSonic 17GA, 1152x870, .27mm | $479 | |
| Sony 200ES 17", 1024x768, .25mm | $479 | |
| Sony 200PS 17", 1280x1024, .25mm | $759 | |
| Sony 20" 500PS, 1600x1200, .30mm | $1289 | |
| **ViewSonic V95 19", 1600x1280, .26mm** | **$589** | SALE |
| ViewSonic G790 19", 1600x1200, .25mm | $769 | |
| ViewSonic G800 20", 1600x1280, .28mm | $929 | |
| ViewSonic P810 21", 1600x1200, .25mm | $1089 | |
| ViewSonic PT815 21", 1600x1200, .25mm | $1219 | |
| RasterOps MC801HR 21", 1600x1200, .22mm | $1319 | |

### SyQuest & ZIP Drives

| | |
|---|---|
| **ZIP 100 External** | **$119** SALE |
| ZIP 100 Plus External | $178 |
| SyJet 1.5GB External | $159* |
| SyQuest 200MB External | $379 |

### Removable Cartridges



Zip100 Carts $9*

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| | |
|---|---|
| SALE JAZ 2GB | $99 |
| **JAZ 1GB** | **$78** |
| Zip 100MB | $11 |
| Syjet 1.5 | $49 |
| 200MB | $55 |
| 88MB | $33 |
| 44MB | $33 |

Syjet 1.5 Carts $49

### Optical Cartridges

| | |
|---|---|
| 74 MINUTE CD ROM RECORDABLE MEDIA $9.99 BOX OF 10 | SALE OEM 128MB $6.79 |
| | OEM 230MB $8.99 |
| | OEM 600/650MB $24.99 |
| | OEM 1.2/1.3GB $36.99 |

### Hard Drives

F/W RAIDs Available

| Description (All SCSI-3 Ultra) | Internal | External | |
|---|---|---|---|
| Quantum 3.2GB 5400 rpm Stratus 9ms | $209 | $269 | |
| Quantum 4.3GB 5400 rpm Straatus 9ms | $269 | $329 | |
| Quantum 4.5GB 7200 rpm Viking II 7.9ms | $439 | $499 | |
| Quantum 6.4GB 5400 rpm Stratus 9ms | $349 | $409 | |
| Quantum 8.4GB 5400 rpm Stratus 9ms | $469 | $529 | |
| **Quantum 9.1GB 7200 rpm Atlas II 7.9ms** | **$499** | **$559** | SALE |
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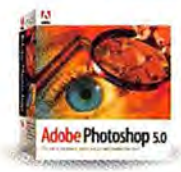
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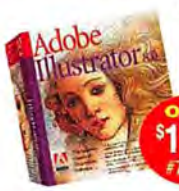

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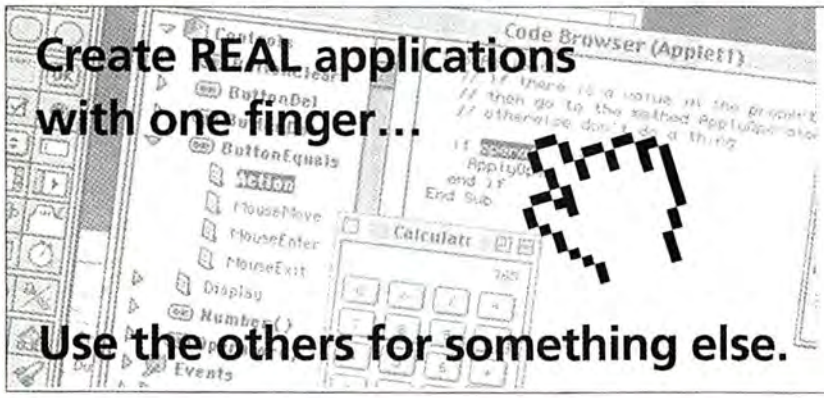
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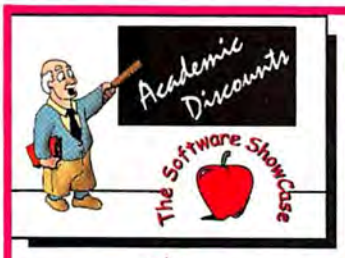



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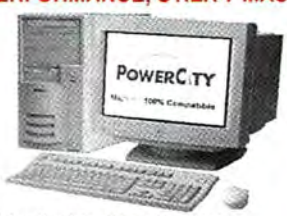
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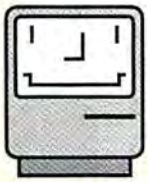
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Internal

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## IDE hard drives

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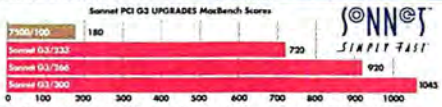
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|---|---|
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| IIcx 8/40/Video | $79 | IIsi 5/40 | $79 |
| LC II 10/80 | $89 | LC III 8/80 | $119 |
| IIci 8/80 | $119 | IIx 8/80 | $79 |
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| Q630 8/250 | $249 | C650 16/500 | $299 |
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| Q800 16/500 | $379 | Q900 20/500 | $399 |
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| 7100/66 8/500/CD | $459 |
| 7100/80 8/500/CD | $499 |
| 8100/80 8/500/CD | $549 |
| 7200/75 8/500/CD | $499 |
| 7200/90 8/500/CD | $599 |
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| Laserwriter IIf | $299 | LW IIg | $399 |
| LW Pro 630 | $699 | LW 16/600 | $899 |
| Laserwriter Pro 810 | | | $999 |
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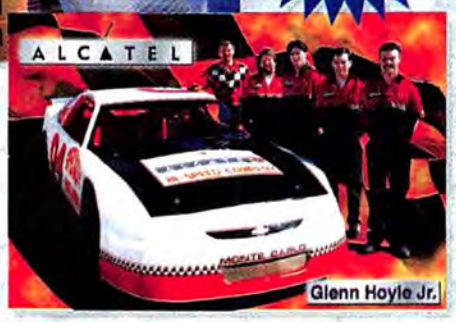
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# The Desktop Critic

by David Pogue

## Talk Support

AT THE APPLE ASSISTANCE CENTER, THE IMPOSSIBLE JUST TAKES A LITTLE LONGER

FOR YEARS, ONE OF the Mac's best features was its help line, 800/SOS-APPL. Never mind that the automatons at the other end wound up learning about the Mac from *you*. Nor that dialing a zero instead of the letter O connected you with "America's hottest sex line." 800/SOS-APPL was fee-free, toll-free, and forever.

Unfortunately, after 12 years, Apple realized that it was getting no credit (in the media or in sales boost) for this massively expensive service. So now, after you've owned a Mac for 90 days, help costs $35 per call. The phone number is different now, too.

When the freebie was taken away, I was just as irritated as everybody else. (Well, maybe not quite as irritated as Performa owners, whose manuals promise *lifetime* free tech support. But we'll let the lawyers hash that one out.)

But recently a friend I'll call Answerman invited me to visit him at work—at an Apple Assistance Center (AAC). He wasn't just going to let me *visit* the center; he was going to give me a patched-in headset and let me *listen* as he took calls.

As the day began, I was overwhelmed. This particular AAC, one of several across the country, is a vast place. Huge LED displays indicate how many customers are on hold. And because tech support is an almost impossible job—*you* try troubleshooting "I think I've erased my ROMs" over the phone—the agents let off steam by dressing up their cubicles with photos, clippings, and Dilbert cartoons.

Answerman's style appalled me at first. Here he was with his feet up on the desk, bouncing a Nerf ball against the ceiling, frequently muting his headset microphone to make asides to me—as some desperate Mac user poured his heart out.

But when I listened to Answerman's muted-mike comments, I slowly began to realize just how good he actually was.

Customer: "Yeah, I've got this StyleWriter 120 with . . . "

Answerman (to me): "He means a 1200."

Customer: ". . . that's when MS Works crashes . . ."

Answerman (to me): "He's probably got At Ease 2.0.2."

Customer: ". . . the only other thing I've got installed is At Ease 2.0.2."

Answerman: "What you need to do, sir, is download the free upgrade to At Ease 2.0.3. . . ."

During my enlightening day at the AAC, I was turned on to the stress-busting document known as Call of the Day: a transcript of the funniest user's call each day, circulated among the agents by e-mail.



Oh, we've all heard the apocryphal stories about the woman who was having trouble with her "foot pedal" (the mouse) or the guy who called to complain that his "cup holder" had broken off (it was the CD-ROM tray). But the Calls of the Day illustrate not how stupid many customers are, but rather how logical. Consider:

• One caller reported that no matter how many times he typed 11, the error message on his screen wouldn't go away. When the agent asked why he was typing 11, the caller replied, "Well, that's what the message says: 'Error, Type 11!'"

• Agent: "Has your computer crashed lately?" Customer: "No, it's been sitting right here on the desk the whole time."

• A woman called to complain that the Mac kept running out of memory at start-up, even after she had upgraded the RAM. Her proof: the "Welcome to Macintosh" start-up progress bar. "It's happening again!" she said furiously. "The memory is filling all the way up!"

• In trying to determine a customer's StyleWriter model, the agent asked whether the printer was color or black-and-white. The caller's response: "Well, it's—it's *beige*."

• One new customer called frantically to report that she had gotten her entire family out of the house and was calling from the neighbors'. Turns out that she had just experienced her first crash. She interpreted the bomb icon (in the system-error dialog box) as a warning that the computer was about to blow up.

I'm a great troubleshooter, but the frustration and indirectness of doing it over the phone make my teeth hurt. I shudder to contemplate the stress of working full-time in tech support, especially at Apple, where the Mac's reputation for friendliness ensures a large percentage of first-timers.

I went home with a deeply changed perspective about Apple's tech-support policies. It really is outrageous that the company charges $35 per call. If you ask me, it should charge *twice* that. **m**

DAVID POGUE (www.davidpogue.com) is the author of *Tales from the Tech Line* (Berkley, 1998).

GORDON STUDER



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